HP B-series Fabric OS 7.0.0c Release Notes

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Version

7.0.0c

NOTE: This software conforms to the Fibre Channel (FC) standards and accepted engineering practices and procedures.

Description

Fabric OS 7.0.0b introduced support for the following new 16 Gbps FC hardware platform:

- HP SN6000B 16Gb FC Switch
  - Up to 48 16 Gbps FC ports
  - 4/8/10/16 Gbps FC for both open systems and FICON environments
  - Access Gateway mode
  - Virtual Fabrics with up to four Local Switches

NOTE: With Fabric OS 7.0.0b, when the HP SN6000B 16Gb FC Switch has a 10 Gbps FC license, it no longer requires an Extended Fabric license to enable FC long distance capability on 10 Gbps FC ports.

Fabric OS 7.0.0a introduced support for the following 16 Gbps FC hardware platforms:

- HP SN8000B 8-Slot SAN Backbone Director Switch
- HP SN8000B 4-Slot SAN Director Switch
- HP SN8000B 16Gb 32-port FC Blade for the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch
- HP SN8000B 16Gb 48-port FC Blade for the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch
- New 16 Gbps Core Blades for the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch (field upgrade of existing director with these core blades is not currently supported)
- Supports 4/8/10/16 Gbps FC for both open systems and FICON environments
- Supports increased ICL bandwidth up to 2 Tbps (with optional licenses) on the HP SN8000B 8-Slot SAN Backbone Director Switch and up to 1 Tbps on the HP SN8000B 4-Slot SAN Director Switch, and ICL distance up to 50m enabling flexible topologies
- Supports up to eight slots for port blades and/or application blades on the HP SN8000B 8-Slot SAN Backbone Director Switch and up to four slots for port blade and/or application blades on the HP SN8000B 4-Slot SAN Director Switch

In addition to the support for the new hardware, several new features were introduced in Fabric OS 7.0.0x (summarized here, then explained in more detail in the section "New features" (page 6)).

- In-flight encryption and compression on 16 Gbps capable ISLs
- Buffer credit loss detection and automatic recovery on 16 Gbps capable ISLs
- 10 Gbps FC capability on 16 Gbps FC platforms
- Advanced diagnostic support on 16 Gbps FC platforms, including D_Port support and Forward Error Correction (FEC)

- FCIP enhancements:
  - 10 GigE lossless failover on the HP DC SAN Director Multiprotocol Extension Blade
  - Adaptive Rate Limiting on HP DC SAN Director Multiprotocol Extension Blade 10 GigE ports
  - Configurable QoS for FCIP tunnels on HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch
  - Auto-mode option for compression on HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch
  - XISL Support on HP DC SAN Director Multiprotocol Extension Blade (ability to use VE ports as XISLs)
  - InBand Management for HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch
  - Relaxed subnet restrictions for HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch
  - FCIP FICON Acceleration Enhancements for HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch
  - GigE/xGigE port sharing across Logical Switches on HP DC SAN Director Multiprotocol Extension Blade
  - Increase in number of circuits per tunnel on 1 GigE ports (6 circuits per tunnel on HP 1606 SAN Extension Switch and 10 circuits per tunnel on HP DC SAN Director Multiprotocol Extension Blade
- Encryption Platform Enhancements (HP StorageWorks Encryption SAN Switch and HP StorageWorks DC Switch Encryption FC Blade):
  - Support for Key Vault Diagnostics (SKM/ESKM)
- Access Gateway Enhancements:
  - Detection of unreliable N_Port links
  - RADIUS/LDAP support
  - APM (Advanced Performance Monitoring) capability
  - F_Port static mapping
- Fabric Watch Enhancements:
  - Switch Status Policy enhancements
  - Support for multiple email recipients for Fabric Watch events
  - Advanced SFP monitoring based on SFP type – 16 Gbps SFP+, 10 Gbps SFP+, 16 Gbps QSFP
  - SFP monitored as a FRU (Field Replaceable Unit)
  - Additional Fabric Watch enhancements
- Advanced Performance Monitoring (APM) Enhancements:
  - Coexistence of TopTalkers and APM on 16 Gbps platforms
  - E_Port TopTalkers support and E_Port End-to-End monitor support on 16 Gbps platforms
  - APM support on Access Gateway – End-to-End monitors and Frame monitors

- Security Enhancements:
  - User-defined roles/RBAC
  - SSH public key authentication support for multiple users
  - SFTP support for firmware download/config upload/download
  - IPv6 support for LDAP authentication
  - Switch banner support
  - Removing support for Brocade certificates for FCAP authentication
- Dynamic Fabric Provisioning - Fabric Assigned WWN
- Fabric Services Enhancements and Updates:
  - Allow a switch with default zone *no access* to merge with a fabric
  - Detection and resolution of duplicate WWNs
  - RASlogs to indicate invalid TI (Traffic Isolation) zones
  - Ability to assign names to logical fabrics
- Additional RAS and Diagnostics Enhancements
- FCoE Enhancements:
  - High Availability of the FCoE storage traffic going through HP DC SAN Director 10/24 FCoE blades on HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch
  - Enhanced FCoE provisioning
  - Auditlog support for DCB/CEE configuration events
  - Enhanced scalability - Increased the number of HP DC SAN Director 10/24 FCoE blades supported on the HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch from 2 to 4. Support for up to 96 10 GE DCB ports per HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch
  - Support for additional DCB/CEE MIBs

Update recommendation

IMPORTANT: Fabric OS 7.0.0a is the minimum required firmware version for the HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, and the HP SN6000B 16Gb FC Switch.

Fabric OS 7.0.0c is also supported on the following 8 Gbps switches:

- HP 8/8 Base (0) E_Port SAN Switch
- HP 8/8 (8) Full Fabric ports Enabled SAN Switch
- HP 8/24 Base (16) Full Fabric ports Enabled SAN Switch
- HP StorageWorks EVA4400 embedded switch module, 8 Gbps Brocade
- HP 8/40 Base (24) Full Fabric ports Enabled SAN Switch
- HP 8/40 Power Pack+ (24) Full Fabric ports Enabled SAN Switch
- HP 8/80 Base (48) Full Fabric ports Enabled SAN Switch
- HP 8/80 Power Pack+ (48) Full Fabric ports Enabled SAN Switch
- HP StorageWorks Encryption SAN Switch

- HP StorageWorks DC SAN Backbone Director Switch Power Pack+
- HP StorageWorks DC04 SAN Director Switch
- HP StorageWorks DC04 Power Pack+ SAN Director Switch
- HP 2408 24-10GbE FC 8–port 8Gb Base FCoE Switch
- HP 2408 24-10GbE 8–port 8Gb PwrPk+ FCoE Switch
- HP 1606 Extension SAN Switch
- Brocade 8Gb SAN Switch for HP BladeSystem c-Class

Fabric OS 7.0.0c is not supported on any 4 Gbps or earlier switches.

HP strongly recommends that you upgrade to Fabric OS 7.0.0c as soon as possible to take advantage of the latest fixes and features.

For more information, see "Firmware upgrade instructions" (page 37).

Supersedes

Fabric OS 7.0.0b, released September 2011

New features

This section describes further details on the new features introduced with Fabric OS 7.0.0x. See the *Fabric OS Administrator's Guide for Fabric OS 7.0.0* for further details on the features in this release.

In-flight Encryption and Compression on 16 Gbps capable ISLs

The in-flight encryption/decryption and compression/decompression features allow frames to be encrypted or compressed while traversing 16 Gbps capable ISLs. In-flight encryption provides security for frames while they are passing between two switches. Compression improves bandwidth utilization on the ISLs, especially over long distance. Encryption and compression are both disabled by default but may be enabled at an individual port level. A maximum of 2 ports at a time on the HP SN6000B 16Gb FC Switch and maximum of 4 ports at a time on each of the HP SN8000B 16Gb 32-port and 48-port FC Blades can support encryption and compression. Encryption and compression can be enabled simultaneously on an ISL, or either encryption or compression alone can be enabled. There is no additional license required to use the in-flight encryption or compression capabilities.

NOTE: This feature is enabled by the ASIC used on 16 Gbps FC platforms and it is independent of the speed at which the ISL is currently operating.

Buffer Credit Loss Detection and Automatic Recovery on 16 Gbps capable ISLs

Fabric OS 7.0.0x adds support for the detection and automatic recovery of buffer credits on 16 Gbps capable ISLs (both ends of the link must terminate on 16 Gbps capable ports). Loss of a single buffer credit is detected at individual Virtual Channel level and is automatically recovered without performing link reset. Loss of multiple buffer credits and stuck VC (VC in permanent zero buffer credit condition) conditions are recovered by performing link reset. RASlogs are generated when credit loss is detected and when the link reset is performed.

10 Gbps FC Capability on 16 Gbps FC Platforms

Ports on the HP SN6000B 16Gb FC Switch or on the HP SN8000B 16Gb 32-port or 48-port FC Blades for the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch can be configured to operate at 10 Gbps FC. This feature requires a 10 Gbps FC slot based license on the HP SN8000B 8-Slot SAN Backbone Director Switch or the HP SN8000B 4-Slot SAN Director Switch (for each blade that will have 10 Gbps FC ports and 10

Gbps FC license on the HP SN6000B 16Gb FC Switch). In Fabric OS 7.0.0x, this feature is supported only on the first eight ports of the HP SN6000B 16Gb FC Switch and each HP SN8000B 16Gb blades.

Advanced Diagnostics Support on 16 Gbps FC Platforms

- D_Port support

  Fabric OS 7.0.0x introduced the concept of the Diagnostic port or D_Port. The D_Port feature allows diagnosis of components associated with a link, such as SFPs and cables. This test performs connectivity checks between various components on the ISL, drives link saturation and measures link distance. This feature is supported on ISLs between 16 Gbps FC platforms using 16 Gbps SFP+ transceivers.

- Forward Error Correction (FEC)

  The FEC feature allows recovery of error bits in a 10 Gbps or a 16 Gbps data stream. It can correct up to 11 error bits in every 2112-bit transmission. This feature is enabled by default on all ISLs of 16 Gbps FC platforms.

- Real-time Power Monitoring

  The new 16 Gbps blades (HP SN8000B 16Gb 32-port or 48-port FC Blades and the Core blades) support real-time measurement of power being consumed by those blades. The real-time power consumption of the HP SN8000B 16Gb 32-port and 48-port FC Blades can be displayed using the `chassisshow` command.

- Advanced SFP Monitoring

  Fabric Watch has been enhanced to monitor 16 Gbps SFP+, 10 Gbps SFP+ and 16 Gbps QSFP. It also allows thresholds to be configured based on the type of the SFP.

Dynamic Fabric Provisioning - Fabric Assigned WWN

To simplify and accelerate server deployment and improve operational efficiency, Fabric OS 7.0.0x now supports Fabric Assigned WWN or FA-WWN, which uses a virtual WWN for a server instead of the server's physical PWWN to create zoning and LUN mapping/masking. Once the server is attached to the SAN, this feature allows the fabric to assign this virtual WWN to the server. This feature requires servers to be using Brocade HBAs/Adapters with HBA driver version to be released in the future. Also, configuration is required at the HBA to utilize FA-WWN.

FCIP Enhancements

Fabric OS 7.0.0x implements the following FCIP enhancements:

- 10 GigE lossless failover on HP DC SAN Director Multiprotocol Extension Blade

  The 10 GigE lossless failover feature allows users to configure a new set of IP addresses and allow a tunnel to failover to the secondary 10 GigE port. There are two types of configurations that are supported: active/active and active/passive. In the active/active case, the data is sent on both 10 GigE ports, thus load-balanced across 10 GigE ports. In active/passive case, the data is failed-over to a passive circuit (one with a higher metric) if all active circuit paths

fail. This feature is supported on HP DC SAN Director Multiprotocol Extension Blade only in 10 Gbps mode.

- Multi-Gigabit circuits on HP DC SAN Director Multiprotocol Extension Blade, which allows more than 1 Gbps to be configured on a single FCIP Circuit

  The Multi-Gigabit Circuit implementation has the following capabilities:

  - Support for circuits with a rate configured at more than 1 Gbps
  - Allowance for up to 10 Gbps minimum rate circuit using a single IP address pair
  - Support for 10 GigE to 10 GigE connections only on multi-gigabit circuits

  This feature is supported on HP DC SAN Director Multiprotocol Extension Blade only in 10 Gbps mode.

- 10 GigE Adaptive Rate Limiting (ARL) on HP DC SAN Director Multiprotocol Extension Blade

  The 10 GigE ARL feature allows users to configure minimum and maximum rates for each circuit of a tunnel that is using xge0 or xge1 on an HP DC SAN Director Multiprotocol Extension Blade.

The 10 GigE ARL feature provides the following capabilities:

- Support for ARL on tunnels over the 10 GigE ports
- Maximum guaranteed rate of 10 Gbps combined for all tunnels over a single 10 GigE port
- Maximum rate of 10 Gbps for any single circuit

Configurable QoS on FCIP tunnel

The configurable QoS option allows a user to override the default percentages of bandwidth assigned to each of the QoS classes within an FCIP tunnel. The default values are those of pre-Fabric OS 7.0.0a predefined rates: 50% for high, 30% for medium, and 20% for low priority traffic. This feature is supported on HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch.

Auto-mode option for compression

On HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch, a new compression mode called *auto-mode* is supported starting with Fabric OS 7.0.0a. This feature adjusts the compression mode (1, 2 or 3) based on the maximum configured tunnel bandwidth. In the auto mode, best compression mode is selected based on the configured maximum bandwidth of the tunnel and advanced compression bandwidth usage in the system.

XISL Support ON HP DC SAN Director Multiprotocol Extension Blade – Ability to use VE ports as XISLs

This feature enables multiple logical fabrics to share a single base fabric while providing fabric-level isolation in Virtual Fabrics environment. Specifically, it enables logical connectivity over FCIP between otherwise disconnected segments of a fabric. This feature is supported only on HP DC SAN Director Multiprotocol Extension Blade in both 1 Gbps and 10 Gbps modes.

InBand Management on HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch

The Inband Management feature allows a user to define one or more IP addresses on the non-management GE ports and provide a management path from WAN (Wide Area Network) to the switch CP. Users can then use these IP addresses to access SNMP events, establish Telnet sessions, and the like.

Relaxing subnet restrictions

Beginning with Fabric OS 7.0.0x, subnet restrictions have been lifted. On HP DC SAN Director Multiprotocol Extension Blade and HP 1606 SAN Extension Switch running pre-Fabric OS 7.0.0a, there was restriction where each IPv4 Gigabit Ethernet interface must have had IP addresses on a separate subnet from all other interfaces and IPv6 addresses must be on separate prefixes from all other interfaces. In addition, the IPv6 interfaces must have had a unique link-local address from the peer node on that interface.

GigE/xGigE port sharing across Logical Switches

On HP DC SAN Director Multiprotocol Extension Blade running pre-Fabric OS 7.0.0a, to create a tunnel in a Logical Switch (LS), both the VE_Port and the corresponding GE_Port must be in the same LS. Starting with Fabric OS 7.0.0a, this limitation is removed. That is, VE ports in different LSs are able to share a GE_Port/xGE_Port that is present in the Default Switch.

Increase in number of circuits on 1 GE ports

In Fabric OS 7.0.0x, the number of circuits supported per tunnel on 1 GE ports has been increased as follows:

- Up to 6 circuits per tunnel on HP 1606 SAN Extension Switch
- Up to 10 circuits per tunnel on HP DC SAN Director Multiprotocol Extension Blade

Encryption Platform Enhancements (HP StorageWorks Encryption SAN Switch / HP StorageWorks DC Switch Encryption FC Blade)

Fabric OS 7.0.0x includes support for the key vault diagnostics. The key vault connectivity information is periodically collected and any connectivity errors are reported as RASlog.

Access Gateway Enhancements

Detection of Unreliable N_Port Links

This feature monitors the reliability of a link on every N_Port of an Access Gateway. If the number of ONLINE/OFFLINE SCNs (State Change Notifications) for a port exceeds a certain threshold within a predefined time period, the link is considered unreliable and failback is disabled for that port. Once the port is reliable again, user configured failback settings are enforced. The port becomes reliable when the number of SCNs is less than the threshold value in the most recent time interval.

RADIUS/LDAP support

Starting with Fabric OS 7.0.0x, RADIUS/Active Directory for user management is supported on the switches operating in AG mode.

APM (Advanced Performance Monitoring) End to End and Frame Monitoring capability

Select Advanced Performance Monitoring capabilities in AG mode are features introduced in the Fabric OS 7.0.0x release. Two types of performance monitors are supported in AG mode: End-to-End Monitor and Frame Monitor.

F_Port Static Mapping

This feature allows users to change an existing F to N_Port mapping by executing a single CLI. Here, F_Ports are statically mapped to an N_Port and port properties such as failover/failback/preferred are always disabled. This new static mapping capability is in addition to previously supported F to N_Port mappings where a user must execute multiple CLI commands to map an F_Port to an N_Port.

Fabric Watch Enhancements

Switch Status Policy enhancements

In Fabric OS 7.0.0x, the switch status policy of Fabric Watch has been enhanced as follows:

- The new component *Error Ports* is introduced in the switch status policy to monitor ports that are segmented and disabled due to reasons such as security violations and port fencing.
- The unit for thresholds (both default and user defined) of Marginal, Faulty, Error Ports, and Missing SFPs are changed to the percentage of the current number of physical ports present in the switch at a given instance of time, rather than the absolute number of physical ports that a switch can support. The total number of physical ports accounted in the switch status policy during threshold calculation excludes FCoE /VE ports/Internal Ports.

Support for multiple email recipients for Fabric Watch Events

The Fabric Watch email alert feature notifies the user of events through a configured email address. In pre-Fabric OS 7.0.0a releases, Fabric Watch allowed users to configure a single email recipient for each class to receive the email alerts. In Fabric OS 7.0.0x, this feature is enhanced to configure multiple email recipients. A maximum of five recipients per class can be configured using the `fwMailCfg` command.

Advanced SFP monitoring based on SFP type

In Fabric OS 7.0.0x Fabric Watch can monitor voltage, current, RXP (receive power), TXP (transmit power), temperature and operational hours of 16 Gbps SFP+. Fabric Watch monitors voltage, temperature, RXP, and current for the 16 Gbps QSFP media. Fabric Watch monitors voltage, temperature, RXP, TXP and current for the 10 Gbps FC SFP+.

Fabric Watch applies `sfptype` based thresholds for SFP monitoring. If Fabric Watch does not find the SFP's `sfptype` in its threshold database, it applies pre-Fabric OS 7.0.0a thresholds on the SFP.

NOTE: By default, Fabric Watch monitoring is disabled on 16 Gbps SFP+, 10 Gbps SFP+, and 16 Gbps QSFP. Advanced `sfptype` monitoring can be enabled on these SFPs using the new command `thmonitor`.

SFP monitored as a FRU (Field Replaceable Unit)

In Fabric OS 7.0.0x, Fabric Watch has been enhanced to monitor SFPs as FRUs (Field Replaceable Units). If a FRU state changes, Fabric Watch sends an email or generates a RASlog message. Users can configure email or RASlog actions for each FRU state using the `fwFruCfg` CLI.

Additional Fabric Watch Enhancements

- Pause and Continue monitoring functionality is provided to monitor specific components at an element level granularity in Fabric OS 7.0.0x. This feature allows users to stop or start monitoring of a set of thresholds related to certain class, area, and index.
- Thresholds for Packet loss area of VE port class can be configured to a real number up to two decimal places (0.00 to 100.00).
- All parameters under port monitoring and SFP monitoring are not monitored on ports without SFPs. Only voltage, temperature, and power-on-hours parameters of SFPs are monitored for offline ports (where SFPs are physically present but ports are offline).
- Fabric Watch supports monitoring End-to-End and Frame monitor classes on Access Gateway platforms.
- The `fwconfigure` and `fwshow` CLIs are not supported in Fabric OS 7.0.0x.
- Second time base and changed event are not supported in Fabric OS 7.0.0x. If any of this is configured, then the upgrade to Fabric OS 7.0.0x is blocked.

Advanced Performance Monitoring (APM) Enhancements

Coexistence of TopTalkers and FCR on 16 Gbps platforms

In Fabric OS 7.0.0x, TopTalkers (Fabricmode/Port level) and FCR features can be enabled simultaneously on the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch 16 Gbps platforms with 16 Gbps based blades, and on the HP SN6000B 16Gb FC Switch.

E_Port TopTalkers support and E_Port End to End monitors support on 16 Gbps platforms

In Fabric OS 7.0.0x, the Port level TopTalkers are supported on E_Ports of 16 Gbps platforms. The functionality provided by the Port level TopTalkers on E_Ports is the same as the one provided by the Port level TopTalkers on F_Ports.

Security Enhancements

User defined roles/RBAC

The user-defined role is a feature in Fabric OS 7.0.0x that provides the ability to create user roles dynamically to manage the switch. This is in contrast to pre-defined user roles supported in pre-Fabric OS 7.0.0a releases. The maximum number of user-defined roles that are allowed on a chassis is 256.

Switch banner support

A new command, `motd`, is added to configure whether a chassis banner should be displayed before user login.

Removing support for Brocade certificates for FCAP authentication

Starting with Fabric OS 7.0.0x, Fabric OS does not support installation/FCAP-authentication using Brocade issued certificates. However, third-party certificates can still be used for FCAP authentication.

SSH authentication using public keys

Fabric OS 7.0.0x supports SSH public key based authentication for multiple users.

SFTP support for `firmwaredownload`, `configupload` and `configdownload`

Users now have the flexibility of choosing SFTP protocol for performing `firmwaredownload`, `configupload`, and `configdownload` operations.

IPv6 support for LDAP authentication

Fabric OS 7.0.0x includes IPv6 support for LDAP authentication. Fabric OS now accepts IPv6 addresses for Active Directory servers.

Fabric Services Enhancements and Updates

Allow a switch with default zone “no access” to merge with a fabric

Fabric OS 7.0.0x allows a switch with default zone “no access” and with no zoning configuration to merge with a fabric that has active zone configuration.

Duplicate WWN detection and resolution

Fabric OS 7.0.0x implements a feature to detect duplicate device WWNs in a fabric. It also enables users to configure a policy to take action once duplicate WWNs are detected.

RASlog upon detecting Invalid TI zones

In a failover disabled configuration of a TI zone, if the switch (domain) becomes unreachable, users are informed about this domain unreachable condition via a RASlog message, which helps users to diagnose and resolve this problem quickly.

Ability to assign names to logical fabrics

The fabric naming feature allows users to assign a user friendly name to identify and manage a logical fabric.

No direct E_Port support with legacy M-series (McDATA) switch

Fabric OS 7.0.0x supports only interopmode 0 and does not support interoperability with an M-series (McDATA) switch via direct E_Port connectivity. FCR can be used to establish connectivity between a fabric with an M-series switch and a fabric with a switch running Fabric OS 7.0.0x.

Additional RAS and Diagnostics Enhancements

Spinfab enhancements

The spinfab diagnostics utility has been enhanced to test ISLs at higher link utilization by using all buffers available at a port. This feature is supported on both 8 Gbps and 16 Gbps FC platforms.

Frame Viewer

The Frame Viewer feature introduced in Fabric OS 7.0.0x provides more visibility to SAN administrators regarding discarded frames due to timeout. This feature is supported both on 8 Gbps and 16 Gbps platforms.

Port Decommission

The Port Decommission feature provides users with the ability to non-disruptively remove an ISL from service. When an ISL is selected for decommissioning, the switches communicate with each other to coordinate the movement of flows off of the ISL to alternative paths. Once the flows are moved to alternative paths, the switches block the E_Ports associated with the ISL being decommissioned to complete the decommission process.

Firmware History Log

Fabric OS 7.0.0x implements a log that keeps track of the firmware versions installed on a switch. The firmware history log retains details of up to the last twenty versions of firmware installed on a switch. This log is available from and stored on the switch.

Ability to assign longer port names

Fabric OS 7.0.0x allows users to assign a port name up to 128 characters, which is an increase from a maximum of 32 characters supported in a pre-Fabric OS 7.0.0a release.

Fabric OS version in Auditlog message header

Fabric OS 7.0.0x adds the Fabric OS version to Auditlog messages to enable users to identify which Fabric OS version generated a specific Auditlog.

FCoE Enhancements

Fabric OS 7.0.0x includes support for High Availability for FCoE traffic going through HP DC SAN Director 10/24 FCoE blade in HP StorageWorks DC SAN Backbone Director Switch/ HP StorageWorks DC04 SAN Director Switch. Upgrade from Fabric OS 7.0.0x to a future Fabric OS release on HP StorageWorks DC SAN Backbone Director Switch/ HP StorageWorks DC04 SAN Director Switch is non-disruptive to both FC and FCoE traffic. A CP failover on an HP StorageWorks DC SAN Backbone Director Switch/ HP StorageWorks DC04 SAN Director Switch running Fabric OS 7.0.0b does not disrupt the FCoE traffic through HP DC SAN Director 10/24 FCoE blade.

Optionally licensed software

Fabric OS 7.0.0x includes all basic switch and fabric support software, as well as optionally licensed software that is enabled via license keys. Optionally licensed features supported in Fabric OS 7.0.0x include the following:

- Brocade Ports on Demand allows customers to instantly scale the fabric by provisioning additional ports via license key upgrade (applies to select models of switches).
- Brocade Extended Fabrics provides greater than 10 km of switched fabric connectivity at full bandwidth over long distances (depending on the platform, this can be up to 3000 km).
- Brocade ISL Trunking provides the ability to aggregate multiple physical links into one logical link for enhanced network performance and fault tolerance. Also includes Access Gateway ISL Trunking on those products that support Access Gateway deployment.
- Brocade Advanced Performance Monitoring enables performance monitoring of networked storage resources. This license includes the Top Talkers feature.
- Brocade Fabric Watch monitors mission-critical switch operations and provides notification if established limits or thresholds are exceeded. Fabric Watch includes Port Fencing capabilities.
- FICON Management Server, also known as CUP (Control Unit Port), enables host-control of switches in Mainframe environments.
- Adaptive Networking with QoS provides a rich framework of capability allowing a user to ensure high priority connections to obtain the bandwidth necessary for optimum performance, even in congested environments. The QoS SID/DID Prioritization and Ingress Rate Limiting features are included in this license, and are fully available on all 8 Gbps and 16 Gbps platforms.
- Server Application Optimization, which, when deployed with Brocade Server Adapters, optimizes overall application performance for physical servers and virtual machines by extending virtual channels to the server infrastructure. Application specific traffic flows can be configured, prioritized, and optimized throughout the entire data center infrastructure. This license is not supported on the HP 2408 24-10 GbE w/8-8 Gbps FCoE Switch.
- Integrated Routing, which allows any port in an HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, HP SN6000B 16Gb FC Switch, HP StorageWorks DC SAN Backbone Director Switch, HP StorageWorks DC04 SAN Director Switch, HP 8/80 Base 48-ports Enabled SAN Switch, HP 8/40 24-ports Enabled SAN Switch, HP 1606 SAN Extension Switch, and the HP StorageWorks Encryption SAN Switch to be configured as an EX_Port or VEX_Port (on some platforms) supporting FC Routing. This eliminates the need to add a dedicated router to a fabric for FCR purposes.
- Encryption Performance Upgrade provides additional encryption processing power for the HP StorageWorks Encryption SAN Switch or an HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, HP StorageWorks DC SAN Backbone Director Switch, or HP StorageWorks DC04 SAN Director Switch. The Encryption Performance License can be installed to enable full encryption processing power.
- Advanced Extension. This license enables two advanced extension features: FCIP Trunking and Adaptive Rate Limiting. The FCIP Trunking feature allows multiple IP source and destination address pairs (defined as FCIP Circuits) via multiple 1 GbE or 10 GbE interfaces to provide a high bandwidth FCIP tunnel and failover resiliency. Each FCIP circuit also supports four QoS classes (Class-F, High, Medium and Low Priority), each as a TCP connection. The Adaptive Rate Limiting feature provides a minimum bandwidth guarantee for each tunnel with full utilization of the available network bandwidth without impacting throughput performance under high traffic load.

  This license is available on the HP 1606 SAN Extension Switch and the HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, HP StorageWorks

DC SAN Backbone Director Switch, and HP StorageWorks DC04 SAN Director Switch for the HP DC SAN Director Multiprotocol Extension Blade on an individual slot basis.

- 10 GbE FCIP/10 Gbps FC. This license enables the two 10 GbE ports on the HP DC SAN Director Multiprotocol Extension Blade or the 10 Gbps FC capability on HP SN8000B 16Gb 32-port FC Blade or the HP SN8000B 16Gb 48-port FC Blade ports. On the HP SN6000C 16Gb FC Switch, this license enables 10G FC ports. This license is available on the HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, HP StorageWorks DC SAN Backbone Director Switch, HP StorageWorks DC04 SAN Director Switch on an individual slot basis.
  - HP DC SAN Director Multiprotocol Extension Blade: With this license assigned to a slot with an HP DC SAN Director Multiprotocol Extension Blade, two additional operating modes (in addition to 10 1 GbE ports mode) can be selected; 10 1 GbE ports and 1 10 GbE port, or 2 10 GbE ports
  - HP SN8000B 16Gb 32-port FC Blade or the HP SN8000B 16Gb 48-port FC Blade: Enables 10 Gbps FC capability on an HP SN8000B 16Gb 32-port FC Blade or the HP SN8000B 16Gb 48-port FC Blade in a slot that has this license.
  - HP SN6000B 16Gb FC Switch: Enables 10Gbps FC capability on the switch.
- Advanced FICON Acceleration. This licensed feature uses specialized data management techniques and automated intelligence to accelerate FICON tape read and write and IBM Global Mirror data replication operations over distance, while maintaining the integrity of command and acknowledgement sequences. This license is available on the HP 1606 SAN Extension Switch and the HP SN8000B 8-Slot SAN Backbone Director Switch, HP SN8000B 4-Slot SAN Director Switch, HP StorageWorks DC SAN Backbone Director Switch, HP StorageWorks DC04 SAN Director Switch for the HP DC SAN Director Multiprotocol Extension Blade on an individual slot basis.
- HP 1606 SAN Extension Switch Port Upgrade allows an HP 1606 SAN Extension Switch to enable 16 FC ports (instead of the base four ports) and six GbE ports (instead of the base two ports). This license is also required to enable additional FCIP tunnels and also for advanced capabilities like tape read/write pipelining.
- HP StorageWorks DC SAN Director ICL 16-link, or Inter Chassis Links provides dedicated high-bandwidth links between two HP StorageWorks DC SAN Backbone Director Switch chassis, without consuming valuable front-end 8 Gbps ports. Each chassis must have the 16-link ICL license installed to enable the full 16-link ICL connections. Available on the HP StorageWorks DC SAN Backbone Director Switch only.
- HP StorageWorks DC SAN Director ICL 8-Link. This license activates all eight links on ICL ports on an HP StorageWorks DC04 SAN Director Switch chassis or half of the ICL bandwidth for each ICL port on the HP StorageWorks DC SAN Backbone Director Switch platform by enabling only eight links out of the sixteen links available. This allows users to purchase half the bandwidth of HP StorageWorks DC SAN Backbone Director Switch ICL ports initially and upgrade with an additional 8-link license to utilize the full ICL bandwidth at a later time. This license is also useful for environments that wish to create ICL connections between an HP StorageWorks DC SAN Backbone Director Switch and an HP StorageWorks DC04 SAN Director Switch, the latter of which cannot support more than eight links on an ICL port. Available on the HP StorageWorks DC04 SAN Director Switch and HP StorageWorks DC SAN Backbone Director Switch platforms only.
- HP SN8000B ICL POD License. This license activates ICL ports on core blades of an HP SN8000B 8-Slot SAN Backbone Director Switch or an HP SN8000B 4-Slot SAN Director Switch. An ICL 1st POD license enables only half of the ICL ports on 16 Gbps 8-Slot Core blade (CR16-8) of an HP SN8000B 8-Slot SAN Backbone Director Switch or all of the ICL ports on 16 Gbps 4-Slot Core blade (CR16-4) on an HP SN8000B 4-Slot SAN Director Switch. An ICL 2nd POD license enables remaining ICL ports on a 16 Gbps 8-Slot Core blade (CR16-8)

on an HP SN8000B 8-Slot SAN Backbone Director Switch platform. (The ICL 2nd POD license does not apply to the HP SN8000B 4-Slot SAN Director Switch.)

Temporary license support

HP now supports Universal Temporary Licenses. To obtain the Universal Temporary Licenses, select the **StorageWorks Software Demo & Evaluation Downloads** option at the HP website: www.software.hp.com.

The following list of licenses are available as Universal Temporary licenses. This means the same license key can be installed on any switch running Fabric OS 6.3 or later that supports the specific feature. Universal Temporary license keys can be installed only once on a particular switch, but can be applied to as many switches as desired. Temporary use duration (the length of time the feature is enabled on a switch) is provided with the license key. All Universal Temporary license keys have an expiration date beyond which the license can no longer be installed on any unit.

- Fabric (E_Port) license
- Extended Fabric license
- Trunking license
- High Performance Extension license
- Advanced Performance Monitoring license
- Adaptive Networking license
- Fabric Watch license
- Integrated Routing license
- Server Application Optimization
- Advanced Extension license
- Advanced FICON Acceleration license
- 10 GbE license/10 Gbps FC license
- FICON Management Server (CUP) license

Standards compliance

This software conforms to the FC standards and accepted engineering practices and procedures. In certain cases, HP might add proprietary supplemental functions to those specified in the standards. For a list of standards conformance, see the HP website: http://www.hp.com.

The 2408 FCoE Converged Network Switch and DC SAN Director Switch 10/24 FCoE Blade conform to the following Ethernet standards:

- IEEE 802.1D, Spanning Tree Protocol (STP)
- IEEE 802.1s, Multiple Spanning Tree
- IEEE 802.1w, Rapid Reconfiguration of Spanning Tree Protocol
- IEEE 802.3ad, Link Aggregation with LACP
- IEEE 802.3ae, 10 Gbps Ethernet
- IEEE 802.1Q, VLAN Tagging
- IEEE 802.1p, Class of Service Prioritization and Tagging
- IEEE 802.1v, VLAN Classification by Protocol and Port
- IEEE 802.1AB, Link Layer Discovery Protocol (LLDP)
- IEEE 802.3x, Flow Control (Pause Frames)

The following draft versions of the CEE and FCoE standards are also supported on the 2408 FCoE Converged Network Switch and DC SAN Director Switch 10/24 FCoE Blade:

- IEEE 802.1Qbb, Priority-based Flow Control
- IEEE 802.1Qaz, Enhanced Transmission Selection
- IEEE 802.1, DCB Capability Exchange Protocol (Proposed under the DCB Task Group of IEEE 802.1 Working Group)
- FC-BB-5, FCoE (Rev. 2.0.0)

New hardware support

Fabric OS 7.0.0b introduced support for the following new hardware platform:

- HP SN6000B 16Gb FC Switch with up to 48 16 Gbps FC ports

Fabric OS 7.0.0a introduced support for the following new hardware platforms:

- HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch
  - Both director switches are highly available, modular, and scalable platforms
  - Includes support for new 16 Gbps Core Blades enabling twice the slot bandwidth available in previous generation directors
- HP SN8000B 16Gb 32-port FC Blade and the HP SN8000B 16Gb 48-port FC Blade

Supported product models

Fabric OS 7.0.0c is supported on the following product models:

- HP SN8000B 8-Slot SAN Backbone Director Switch (DCX8510-8)
- HP SN8000B 4-Slot SAN Director Switch (DCX8510-4)
- HP SN8000B 16Gb 32-port FC Blade (FC16-32)
- HP SN8000B 16Gb 48-port FC Blade (FC16-48)
- HP SN6000B 16Gb FC Switch (Brocade 6510)
- HP StorageWorks 8/8 and 8/24 SAN Switches (Brocade 300)
- HP StorageWorks 8/40 SAN Switch (Brocade 5100)
- HP StorageWorks 8/80 SAN Switch (Brocade 5300)
- HP StorageWorks Encryption SAN Switch (Brocade BES)
- HP StorageWorks DC04 SAN Director (Brocade DCX-4S)
- HP StorageWorks DC SAN Backbone Director (Brocade DCX)
- HP StorageWorks SAN Director 16 Port 8Gb FC Blade (Brocade FC8-16)
- HP StorageWorks SAN Director 32 Port 8Gb FC Blade (Brocade FC8-32)
- HP StorageWorks SAN Director 48 Port 8Gb FC Blade (Brocade FC8-48)
- HP StorageWorks SAN Director 64 Port 8Gb FC Blade (Brocade FC8-64)
- HP StorageWorks SAN Director 6 Port 10Gb FC ISL Blade (Brocade FC10-6)
- HP StorageWorks DC Switch Encryption FC Blade (Brocade FS8-18)
- HP StorageWorks EVA4400 Embedded Switch Module (Brocade 5410)
- Brocade 8Gb SAN Switch for HP BladeSystem c-Class (Brocade 5480)
- HP StorageWorks 1606 Extension SAN Switch (Brocade 7800)

- HP StorageWorks 2408 FCoE Converged Network Switch (Brocade 8000)
- HP StorageWorks DC SAN Director Switch 10/24 FCoE Blade (Brocade FCOE10-24)
- HP StorageWorks DC SAN Director Multiprotocol Extension Blade (Brocade FX8-24)

Unsupported product models

Any product models not listed in "Supported product models" (page 16) do not support Fabric OS 7.0.0a or later.

Devices supported

For a list of supported devices, see the HP website:

http://www.hp.com/go/san

Operating systems

For a list of operating systems, see the HP website:

http://www.hp.com/go/san

Access Gateway support

Access Gateway is supported with Fabric OS 7.0.0c for the following HP products only:

- Brocade 8Gb SAN Switch for HP BladeSystem c-Class (Brocade 5480)
- HP StorageWorks 8/24 SAN Switch (Brocade 300)
- HP StorageWorks 8/40 SAN Switch (Brocade 5100)
- HP StorageWorks 2408 FCoE Converged Network Switch (Brocade 8000)
- HP SN6000B 16Gb FC Switch (Brocade 6510)

IMPORTANT: Although the 8/8 SAN Switch uses the same hardware as the 8/24 SAN Switch, it does not support Access Gateway because only the 8/24 switch has all ports licensed as required for Access Gateway support. Similarly, for the 8/40 switch to support Access Gateway mode, all ports must be licensed. If you are using DCFM to manage a fabric with a 2408 FCoE switch in Access Gateway mode, version 10.4.0 or later is required.

NOTE: EVA storage arrays are not supported directly connected to any switch configured for Access Gateway mode.

Access Gateway connectivity is supported by the switches listed in this section and also by the following B-series switches:

- HP StorageWorks 4/16 SAN Switch (Brocade 200e)
- HP StorageWorks 4/32 SAN Switch
- HP StorageWorks 4/32B SAN Switch
- HP StorageWorks 4/64 SAN Switch
- HP StorageWorks 4/256 SAN Director
- Brocade 4Gb SAN Switch for HP p-Class BladeSystem (Brocade 4012)
- Brocade 4Gb SAN Switch for HP c-Class BladeSystem (Brocade 4024)
- HP StorageWorks 8/80 SAN Switch
- HP StorageWorks DC SAN Backbone Director
- HP StorageWorks DC04 SAN Director

- HP StorageWorks 400 Multiprotocol Router
- HP StorageWorks EVA4400 Embedded Switch Module
- HP StorageWorks 1606 Extension SAN Switch (Brocade 7800)
- HP SN8000B 8-Slot SAN Backbone Director Switch
- HP SN8000B 4-Slot SAN Director Switch

Access Gateway allows a switch to operate in `agmode`, which provides simplified connectivity between large numbers of servers and the SAN. Access Gateway leverages N_Port ID Virtualization (NPIV) to hide the complexity of the servers (both physical and virtual) attached to it, while allowing easy SAN connectivity. The edge fabric switch provides all fabric services, while Access Gateway connects to the edge switch by what appears as a host bus adapter (HBA) connection. This architecture allows the deployment of many additional servers without requiring a domain and the associated fabric rebuild traffic, which is prevalent when switches are powered on, added, or removed from a fabric.

For more information, see the *Brocade Access Gateway Administrator's Guide*, available on http://www.hp.com/go/san.

NOTE: HP does not support B-series switches configured in Access Gateway mode directly connected to any HP EVA storage array.

Access Gateway support in non-Brocade fabrics

In addition to being supported in Brocade fabrics, Access Gateway is supported for connectivity to the following:

- McDATA switches: M4400, and Mi10K running EOS 09.09.07 with Brocade Fabric OS 6.2.2x.
- McDATA switches: M4400, M4700, and Mi10K running EOS 09.09.07 with Brocade Fabric OS 6.3.2x.
- McDATA switches: M4400, M4700, and Mi10K running EOS 09.09.07 with Brocade Fabric OS 6.4.0x and 6.4.1x.
- McDATA switches: M4400, M4700, and Mi10K running EOS 09.09.09 with Brocade Fabric OS 7.0.0a or 7.0.0b.
- Cisco switches: MDS 9216A, MDS 9216i, MDS 9506, MDS 9509, MDS 9120, MDS 9140, MDS 9124, and MDS 9134 running SAN OS 3.2(3), 3.3(2), 3.3(3), 3.3(4), 3.3(4a) and 3.3(5) with Brocade Fabric OS 6.2.2x
- Cisco switches: MDS 9216i, MDS 9222i, MDS 9124, MDS 9124e, MDS 9134, MDS 9506, MDS 9509, and MDS 9513 running NX-OS 4.2(7d) with Fabric OS 6.2.2e
- Cisco switches: MDS 9222i, MDS 9124, MDS 9124e, MDS 9134, MDS 9506, MDS 9509, and MDS 9513 running NX-OS 5.0(4) with Fabric OS 6.2.2e
- Cisco switches: MDS 9216A, MDS 9120, MDS 9140, MDS 9124, MDS 9134, MDS 9506, and MDS 9509 running SAN-OS 3.3(2), 3.3(3), 3.3(4), 3.3(4a), or 3.3(5) with Brocade Fabric OS 6.3.2x
- Cisco switches: MDS 9134, MDS 9124, and MDS 9124e running NX-OS 4.1(3a), 4.2(3) or 4.2(5) with Brocade Fabric OS 6.3.2x
- Cisco switches: MDS 9216i running SAN-OS 3.3(1c) or NX-OS 4.1(1c), 4.2(3) or 4.2(5) with Brocade Fabric OS 6.3.2x
- Cisco switches: MDS 9216A, MDS 9120, MDS 9140, MDS 9509 and MDS 9506 running SAN-OS 3.3(4a) or 3.3(5) with Brocade Fabric OS 6.4.0x and 6.4.1x
- Cisco switches: MDS 9216i, MDS 9134, MDS 9124, MDS 9124e, MDS 9513, MDS 9509 and MDS 9506 running NX-OS 4.2(3) or 4.2(5) with Brocade Fabric OS 6.4.0x or 6.4.1x

- Cisco switches: MDS 9134, MDS 9124, MDS 9124e running NX-OS 5.0(4) with Brocade Fabric OS 6.4.0x and 6.4.1x.
- Cisco switches: MDS 9134, MDS 9124, MDS 9124e running NX-OS 5.0(4) and 5.0(4b) with Brocade Fabric OS 7.0.0a and 7.0.0b.
- Cisco switches: MDS 9216i running NX-OS 4.2(7a) and 4.2(7d) with Brocade Fabric OS 6.4.0x and 6.4.1x or Fabric OS 7.0.0a and 7.0.0b
- Cisco switches: MDS 9513, MDS 9509 and MDS 9506 running NX-OS 5.0(4) with Brocade Fabric OS 7.0.0a or 7.0.0b
- Qlogic switches: SN6000 and 8/20q running Qlogic 8.0.4.04.00 firmware with Brocade Fabric OS 7.0.0a or 7.0.0b.

NOTE: See the latest B-series FC connectivity switch stream for information on the specific versions of firmware currently supported for a specific manufacturer.

Zoning and fabric operations

When configuring zoning or other fabric-wide settings in a fabric that has products operating with different versions of Fabric OS, HP recommends that you perform the configuration through an interface (such as Web Tools) to a product with the most recent version of Fabric OS. Some older versions of Fabric OS do not fully support newer hardware models, and problems may arise when configuring settings through these older products.

NOTE: Do not configure zoning through a switch operating with Fabric OS 3.x in a fabric that has products operating with later versions of Fabric OS.

Prerequisites

Table 1 (page 20) lists the supported Fabric OS firmware versions. HP recommends using the latest supported firmware versions to get the greatest benefit from the SAN.

For a list of retired products, see the HP website:

http://www.hp.com

IMPORTANT: The Fabric OS versions listed in the **Earliest compatible version** column in Table 1 (page 20) are the earliest versions supported by HP for connection to switches running Fabric OS 7.0.0c at the time of release.

Table 1 Supported Fabric OS versions

Model	Earliest compatible version	Recommended version
HP StorageWorks MSA SAN Switch 2/8	3.2.1c	3.2.1c[1,3,4]
HP StorageWorks SAN Switch 2/16 HP StorageWorks SAN Switch 2/8-EL HP StorageWorks SAN Switch 2/16-EL HP StorageWorks Core Switch 2/64 HP StorageWorks SAN Director 2/128 in Chassis Config modes 3 and 4 only	Not supported (support ended September 2009)	N/A
HP StorageWorks SAN Switch 2/8V HP StorageWorks SAN Switch 2/16V HP StorageWorks SAN Switch 2/32	Not supported (support ended November 2010)	N/A
HP StorageWorks SAN Director 2/128	Not supported (support ended August 2011)	N/A
HP StorageWorks 4/8 SAN Switch HP StorageWorks 4/16 SAN Switch	6.2.2e	6.2.2e
HP StorageWorks 4/256 SAN Director HP StorageWorks 4/64 SAN Switch HP StorageWorks B-series MP Router Blade (FR4-18i) HP StorageWorks 16 Port 4Gb Blade (FC4-16) HP StorageWorks 32 Port 4Gb Blade (FC4-32) HP StorageWorks 48 Port 4Gb Blade (FC4-48) HP StorageWorks 400 MP Router HP StorageWorks 4/32 SAN Switch HP StorageWorks 4/32B SAN Switch HP StorageWorks B-series iSCSI Director Blade (FC4-16IP)	6.2.2e	6.4.2b[2]
Brocade 4Gb SAN Switch for HP p-Class BladeSystem Brocade 4Gb SAN Switch for HP c-Class BladeSystem	6.2.2e	6.2.2e[2]
HP StorageWorks MP Router	Not supported for connectivity to switches running Fabric OS 7.x	Not supported for connectivity to switches running Fabric OS 7.x
HP StorageWorks DC SAN Backbone Director	6.2.2e	7.0.0c
Brocade 8Gb SAN Switch for HP BladeSystem c-Class	6.2.2e	7.0.0c
HP StorageWorks EVA4400 Embedded Switch Module, 8Gb Brocade	6.2.2e	7.0.0c
HP StorageWorks DC04 SAN Director	6.2.2e	7.0.0c
HP StorageWorks SAN Director 16 Port 8Gb FC Blade (FC8-16) HP StorageWorks SAN Director 32 Port 8Gb FC Blade (FC8-32) HP StorageWorks SAN Director 48 Port 8Gb FC Blade (FC8-48)	6.2.2e	7.0.0c
HP StorageWorks SAN Director 6 Port 10Gb ISL Blade (FC10-6)	6.2.2e	7.0.0c

Table 1 Supported Fabric OS versions *(continued)*

Model	Earliest compatible version	Recommended version
HP StorageWorks 8/8 SAN Switch HP StorageWorks 8/24 SAN Switch HP StorageWorks 8/40 SAN Switch HP StorageWorks 8/80 SAN Switch	6.2.2e	7.0.0c
HP StorageWorks Encryption SAN Switch	6.2.2e	7.0.0c
HP StorageWorks 1606 Extension SAN Switch (Brocade 7800)	6.3.2b	7.0.0c
HP StorageWorks 2408 FCoE Converged Network Switch (Brocade 8000)	6.3.2b	7.0.0c
HP StorageWorks DC SAN Director Switch 10/24 FCoE Blade (Brocade FCOE10-24)	6.3.2b	7.0.0c
HP StorageWorks DC SAN Director Multiprotocol Extension Blade (Brocade FX8-24)	6.3.2b	7.0.0c
HP SN8000B 8-Slot SAN Backbone Director Switch	7.0.0a	7.0.0c
HP SN8000B 4-Slot SAN Director Switch	7.0.0a	7.0.0c
HP SN8000B 16Gb 32-port FC Blade	7.0.0a	7.0.0c
HP SN8000B 16Gb 48-port FC Blade	7.0.0a	7.0.0c
HP SN6000B 16Gb FC Switch	7.0.0a	7.0.0c
HP StorageWorks DC Switch Encryption FC Blade	6.2.2e	7.0.0c
Data Center Fabric Manager **NOTE:** DCFM does not support any 16 Gb products	10.3.0	10.4.5a
HP Network Advisor	11.1.0	11.1.2

Table notes:

[1] All zoning and fabric operations in a fabric with products running older versions of Fabric OS should be performed using interfaces to products running the latest version of Fabric OS. This is important for Brocade 3*xxx* series switches that do not support zoning configuration for newer products.

[2] When directly attached to a host or target that is part of an encryption flow.

[3] Products operating with Fabric OS versions earlier than 5.3.1b or 6.1.0e cannot participate in a logical fabric that is using XISLs (in the base fabric).

[4] These platforms cannot be directly attached to hosts or targets for encryption flows.

DC SAN Backbone and DC04 SAN Director blade support

Fabric OS 7.0.0c is fully qualified and supports the DC Director blades listed in Table 2 (page 21).

Table 2 DC Director blade support matrix

Director blade	Number of blades
FC8-16 FC8-32 FC8-48	Supported with Fabric OS 6.0.0b or later with any mix, with up to eight blades of each type on the DC SAN Backbone Director. There are no intermix restrictions. The DC04 SAN

Table 2 DC Director blade support matrix *(continued)*

Director blade	Number of blades
FC8-64 FC10-6	Director requires Fabric OS 6.2.0a or later, and supports up to four blades. FC8-64 requires 6.4.0a or later.
FC4-16IP (iSCSI blade)	Not supported with the DC SAN Backbone Director or DC04 SAN Director
FR4-18i (FCIP/FC Router blade)	Supported with Fabric OS 6.0.0b or later, with a maximum of four blades of this type on the DC SAN Backbone Director. Up to eight FR4-18i blades can be installed if they are used only for FC FastWrite or FCIP without routing on the DC SAN Backbone Director. The DC04 SAN Director requires Fabric OS 6.2.0a or later, and supports up to four blades. **NOTE:** FR4-18i cannot coexist with FX8-24 in Fabric OS 7.0.0x. FR4-18i does not support EX_Ports, FC fastwrite and WAN optimization features in Fabric OS 7.0.0x. FR4-18i supports VEX ports on Fabric OS 7.0.0x.
FS8-18 (DC Switch Encryption FC blade) FX8-24 (DC SAN Director Multiprotocol Extension Blade)	Supported with Fabric OS 6.2.0b or later, with a maximum of four blades of this type on the DC SAN Backbone Director or DC04 SAN Director. Up to two FX8-24 blades are supported beginning with Fabric OS 6.3.0x. Up to four are supported beginning with Fabric OS 6.4.0x. **NOTE:** FR4-18i cannot coexist with FX8-24 in Fabric OS 7.0.0x.
FCOE10-24 (DC SAN Director Switch 10/24 FCoE Blade)	Supported starting with Fabric OS 6.3.0x, with a maximum of two blades per director. The DC SAN Director Switch 10/24 FCoE Blade can be installed in the same chassis only with FC8-xx (except FC8–64) and/or FC10-6 blades. It is not supported in the chassis with any other blades.

SN8000B 8-Slot and 4-Slot Director blade support

Fabric OS 7.0.0c software is fully qualified and supports the blades for the HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch noted in Table 3 (page 22). The 16 Gb hardware must run Fabric OS 7.0.0a at a minimum.

Table 3 Blade Support Matrix for HP SN8000B 8-Slot SAN Backbone Director Switch and HP SN8000B 4-Slot SAN Director Switch

Director blade	Number of blades
FC16-32 (32-port 16Gb FC blade) FC16-48 (48-port 16Gb FC blade)	Supported with Fabric OS 7.0.0a or later with any mix, with up to a maximum of eight blades on the HP SN8000B 8-Slot director and up to a maximum of four blades on the HP SN8000B 4-Slot director.
FC8-64 (64-port 8Gb FC blade)	Supported with Fabric OS 7.0.0a or later with any mix, with up to a maximum of eight blades of this type on the HP SN8000B 8-Slot director and up to a maximum of four blades of this type on the HP SN8000B 4-Slot director. **NOTE:** FC8-16, FC8-32, FC8-48 blades are not supported on HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch running Fabric OS 7.0.0a or later.
FC10-6 (6-port 10Gb FC ISL blade)	Not supported
FR4-18i (FCIP/FC Router blade)	Not supported
FS8-18 (Encryption Blade)	Up to a maximum of 4 blades of this type

Table 3 Blade Support Matrix for HP SN8000B 8-Slot SAN Backbone Director Switch and HP SN8000B 4-Slot SAN Director Switch *(continued)*

Director blade	Number of blades
FX8-24 (Next Generation Distance Extension Blade)	Up to a maximum of 4 blades of this type
FCOE10-24 (FCoE/L2 CEE blade)	Not supported

Power supply requirements for Director blades

Table 4 (page 23) lists power supply requirements for Director blades to provide full redundancy (220 VAC power is assumed).

Table 4 Power supplies required for blades in Director chassis

Director blade	DC SAN Backbone Director and DC04 SAN Director
FC8-16 FC8-32	Two power supplies[1]
FC8-48 FC8-64 FC10-6	Two power supplies[2]
FR4-18i (FCIP/FC Router blade) FC4-16IP (iSCSI blade)	Two power supplies. The FC4-16IP blades are not supported in the DC SAN Backbone Director or DC04 SAN Director.[2]
FS8-18 (DC Switch Encryption FC Blade) FX8-24 (DC SAN Director Multiprotocol Extension Blade) FCOE10-24 (DC SAN Director Switch 10/24 FCoE Blade)	Two power supplies. For the DC SAN Backbone Director with three or more FS8-18 blades, (2+2) 220 VAC power supplies are required for redundancy. For one or two FS8-18 blades, only two power supplies are required for redundancy. For the DC04 SAN Director, only two 220 VAC power supplies are required for redundancy with any number of FS8-18 blades. For the DC SAN Backbone Director or DC04 SAN Director, only two 220 VAC power supplies are required for redundancy with FX8-24 blades.[2]

[1] The FC blades in this row are the only ones supported in the DC SAN Backbone Director or DC04 SAN Director with 110 VAC power supplies.

[2] 110 VAC is not supported in either the DC SAN Backbone Director or DC04 SAN Director with these blades.

Table 5 Power Supply Requirements for HP SN8000B 8-Slot SAN Backbone Director Switch

Number of Ports	Director blade	HP SN8000B 8-Slot SAN Backbone Director Switch
Any combination of 8 Gbps or 16 Gbps ports with QSFP ICLs	FC8-64 FC16-32	Two power supplies
256 16 Gbps ports + QSFP ICLs	FC16-32 FC16-48 (Maximum of fully populated FC16-32 blades)	Two power supplies
192 16 Gbps Ports & max 2 intelligent boards (FX8-24 /FS8-18/combination) with QSFP ICLs	FC16-32 FC16-48 FX8-24 FS8-18	Two power supplies
336 16 Gbps ports + QSFF ICLs	FC16-48 (Maximum of seven FC16-48 blades, with one empty port blade slot)	Two power supplies

Table 5 Power Supply Requirements for HP SN8000B 8-Slot SAN Backbone Director Switch *(continued)*

Number of Ports	Director blade	HP SN8000B 8-Slot SAN Backbone Director Switch
384 16 Gbps ports + QSFP ICLs	FC16-32 FC16-48	Four power supplies
Any combination of 8 Gbps or 16 Gbps ports and intelligent blades with QSFP ICLs	FC16-32 FC16-48 FC8-64 FS8-18 FX8-24	Four power supplies

Table 6 Power Supply Requirements for HP SN8000B 4-Slot SAN Director Switch

Number of Ports	Director blade	HP SN8000B 4-Slot SAN Director Switch
96 ports max with QSFP ICLs	FC16-32	Two power supplies
Any combination of 8 Gbps or 16 Gbps ports and intelligent blades with QSFP ICLs	FC16-32 FC16-48 FC8-64 FS8-18 FX8-24	Two power supplies

FC Routing scalability

For the latest information about FC Routing (FCR) scalability support, see the *HP StorageWorks SAN Design Reference Guide*, available at:

http://www.hp.com/go/sandesignguide

Important notes and recommendations

This section contains information that you should consider before you use this Fabric OS release.

HP Network Advisor compatibility

Fabric OS 7.0.0c is fully compatible with HP Network Advisor 11.1.0 or later management software. HP Network Advisor is a comprehensive SAN management application that enables end-to-end management of HP B-series data center fabrics. It is the next-generation product and the successor to Data Center Fabric Manager (DCFM).

HP Network Advisor is available in three versions (see the HP Network Advisor release notes for full support details):

- **HP Network Advisor Professional**—An application bundled with B-series switches that is ideally suited for small- and medium-size businesses that need a lightweight management product to manage their smaller fabrics (one physical fabric at a time, up to 1,000 ports). HP Network Advisor Professional supports DC04 SAN Director, SN8000B 4-Slot SAN Director Switch and 4/256 SAN Director (but not DC SAN Backbone Director or SN8000B 8-Slot SAN Backbone Director Switch), FC switches, FCIP switches, FCR switches/Integrated Routing (IR) capabilities, FCoE/CEE switches, and Brocade HBAs.
- **HP Network Advisor Professional Plus**—A SAN management application designed for medium-size businesses to manage up to four physical Fabric OS fabrics and up to 2,560 switch ports. HP Network Advisor Professional Plus supports DC04 SAN Director, SN8000B 4-Slot SAN Director Switch and 4/256 SAN Director (but not DC SAN Backbone Director or SN8000B 8-Slot SAN Backbone Director Switch), FC switches, FCIP switches, FCR

switches/Integrated Routing (IR) capabilities, FCoE/CEE switches, encryption switch and blade, and Brocade HBAs. Enterprise-class customers who want to manage departmental SANs can consider deploying this product.

- **HP Network Advisor Enterprise**—An application designed for enterprise-class customers that provides unparalleled performance and scalability (24 physical fabrics, up to 9,000 switch ports). HP Network Advisor Enterprise configures and manages the same switches and directors as Professional and Professional Plus, but also adds support for the DC SAN Backbone Director and SN8000B 8-Slot SAN Backbone Director Switch. HP Network Advisor Enterprise is required to manage FICON fabrics. Existing DCFM customers that have active Maintenance and Support contracts are provided a seamless migration path to HP Network Advisor Enterprise.

DCFM Compatibility

With the introduction of HP Network Advisor, DCFM has been put into sustaining mode. DCFM is not qualified or supported for management of switches operating with Fabric OS 7.0.0a and later firmware versions.

IMPORTANT: You must first upgrade DCFM to Network Advisor 11.1.0 or later if you are planning to upgrade devices to Fabric OS 7.0.0c or you risk losing management connectivity.

Fabric OS compatibility

"Supported Fabric OS versions" (page 20) lists the earliest versions of software supported in this release, that is, the earliest supported software versions that interoperate. HP recommends using the latest software versions to get the greatest benefit from the SAN.

When using the Virtual Fabrics (VF) feature, HP recommends that all switches participating in a fabric with a logical switch use the latest firmware available. All switches must be operating at the minimum firmware levels or later, as noted in the Fabric OS Interoperability table.

Web Tools compatibility

Fabric OS 7.0.0c is qualified and supported only with Oracle JRE 1.6.0 update 24.

SMI compatibility

- Host SMI-S agents cannot be used to manage switches running Fabric OS 7.0.0c.
- To manage a switch running Fabric OS 7.0.0c using the SMI-S interface, you must use HP Network Advisor's integrated SMI agent.

Other recommendations

Adaptive Networking/flow-based QoS prioritization

- Any 8 Gbps or 4 Gbps FC platform running Fabric OS 6.2.2e or earlier version of firmware cannot form an E_Port with a 16 Gbps FC platform when Adaptive Networking QoS is enabled at both ends of the ISL. Users must disable QoS at either end of the ISL in order to successfully form an E_Port under this condition.

  Users can disable QoS via the `portcfgQos --disable` command. See the Brocade Fabric OS Command Reference Guide for specific details of the `portcfgQoS` command.

- When using QoS in a fabric with 4 Gbps ports or switches, Fabric OS 6.2.2 or later must be installed on all products in order to pass QoS information. E_Ports from the DC SAN Backbone Director or DC04 SAN Director to other switches must come up after 6.x is running on those switches.

Access Gateway device-based mapping in ESX environments

Users who want to utilize Access Gateway's Device-based mapping feature in the ESX environments should refer to the Brocade Tech Note *Using Brocade Access Gateway Device-Based Mapping in VMware ESX Server Environments* for best implementation practices. This document can be downloaded from the following HP website:

http://www.hp.com/support/manuals

Under **storage**, select **Storage networking**, and then select the appropriate switch under **B-series Switches**.

Access Gateway Cascading

Access Gateway cascading is not supported on the HP SN6000B 16Gb FC Switch.

Brocade HBA/Adapter Compatibility

Brocade HBA/Adapter should be using driver version 2.3.0.2 or later when attached to 16 Gbps ports on Brocade switches.

D_Port

- Fabric OS 7.0.0x supports the execution of D_Port tests concurrently on up to eight ports on the switch.
- D_Port tests may be executed only on ports configured for `portcfglongdistance port# L0` or normal port distance mode. Executing D_Port tests on long distance ports may cause tests to fail due to time out exceeded.

  NOTE: The following message appears in CLI when Enabling D_Port with HP B-series SFPs `Caution: D_Port functionality is only available on 16G-capable platforms with Brocade branded 16G SFPs and 10G FC SFPs. Electrical and Optical loopback tests are supported only for Brocade branded 16G SFPs`. Although this message appears, D_Port functions as expected with the HP B-series SFPs installed. This error message will be removed in a subsequent Fabric OS release.

- There is no D_Port capability for 10 Gbps links nor for the 16 Gbps fabric at the far end of the 10 Gbps link.

Encryption Behavior for the HP StorageWorks Encryption SAN Switch and HP StorageWorks DC Switch Encryption FC Blade

- When doing a firmware upgrade to Fabric OS 7.0.0c or downgrade from Fabric OS 7.0.0c, message SPM-1016 is issued on nodes in the EG (Encryption Group) when there are other nodes in that EG that are still running pre-Fabric OS 7.0.0a. Although this is a warning message, it is transient and is observed only during a firmware upgrade or downgrade operation and can be ignored. The message text is: `2011/04/12-18:41:08, [SPM-1016], 17132, FID 128, WARNING, pt1b-tw-102, Security database is out of sync. This warning can be ignored if the nodes in the EG are running different versions of FOS.`
- If the migration to Fabric OS 7.0.0c does not occur from 6.4.1a, 6.4.1b, or 6.4.2a or later, the following message is issued: `HP StorageWorks Encryption SAN Switch will reboot if auto reboot is enabled otherwise it needs to be rebooted manually for recovery2010/11/08-04:54:35:485488, [FSS-1009], 4424/886, CHASSIS, ERROR, MACE, FSS Error: fcsw0-vs: MISMATCH: component., svc.c, line: 2462, comp:FSSK_TH, ltime:2010/11/08-04:54:35:485484.`

- Addition of 3PAR Session/Enclosure LUNs to CTCs is now supported. Session/Enclosure LUNs (LUN 0xFE) used by 3PAR InServ arrays must be added to CryptoTarget (CTC) containers with LUN state set to `cleartext`, encryption policy set to `cleartext`. HP StorageWorks Encryption SAN Switch/HP StorageWorks DC Switch Encryption FC Blade do not perform any explicit enforcement of this requirement.
- The `cryptocfg –manual_rekey –all` command should not be used in environments with multiple encryption engines (HP StorageWorks DC Switch Encryption FC blades) installed in an HP StorageWorks DC SAN Backbone Director Switch / HP StorageWorks DC04 SAN Director Switch/ HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch chassis when more than one encryption engine has access to the same LUN. In such situations, use the `cryptocfg –manual_rekey <CTC><LUN Num><Initiator PWWN>` command to manually rekey these LUNs.
- When adding nodes to an Encryption Group, ensure all node Encryption Engines are in an enabled state.
- When host clusters are deployed in an Encryption environment, note the following recommendations:
  - If two EEs (encryption engines) are part of an HAC (High Availability Cluster), configure the host/target pair such that they form a multipath from both EEs. Avoid connecting both the host/target pairs to the same EE. This connectivity does not give full redundancy in the case of EE failure resulting in HAC failover.
  - Since quorum disk plays a vital role in keeping the cluster in sync, configure the quorum disk to be outside of the encryption environment.
- The `–key_lifespan` option has no effect for `cryptocfg –add –LUN`; it has an effect only for `cryptocfg --create –tapepool` for tape pools declared `-encryption_format` native. For all other encryption cases, a new key is generated each time a medium is rewound and block zero is written or overwritten. For the same reason, the Key Life field in the output of `cryptocfg --show -container -all –stat` should always be ignored, and the "Key life" field in `cryptocfg --show –tapepool –cfg` is significant only for native-encrypted pools.
- The Quorum Authentication feature requires a compatible DCFM or HP Network Advisor release (DCFM 10.4 or later for pre-Fabric OS 7.0.0a and Network Advisor 11.1 or later for Fabric OS 7.0.0x) that supports this feature. Note, all nodes in the EG must be running Fabric OS 6.3.0 or later for quorum authentication to be properly supported.
- The System Card feature requires a compatible DCFM or HP Network Advisor release (DCFM 10.4 or later for pre-Fabric OS 7.0.0a and Network Advisor 11.1 or later for Fabric OS 7.0.0x) that supports this feature. All nodes in the EG must be running Fabric OS 6.3.0 or later for system verification to be properly supported.
- The HP StorageWorks Encryption SAN Switch and HP StorageWorks DC Switch Encryption FC Blade do not support QoS. When using encryption or Frame Redirection, participating flows should not be included in QoS Zones.
- HP SKM/ESKM are supported with Multiple Nodes and Dual SKM/ESKM Key Vaults. Two-way certificate exchange is supported. See the Encryption Admin Guide for configuration information. If you are using dual SKM/ESKMs on HP StorageWorks Encryption SAN Switch/HP StorageWorks DC Switch Encryption FC Blade Encryption Group, then these SKM/ESKM appliances must be clustered. Failure to cluster results in key creation failure. Otherwise, register only one SKM/ESKM on the HP StorageWorks Encryption SAN Switch/HP StorageWorks DC Switch Encryption FC Blade Encryption Group.
- With Windows and Veritas Volume Manager/Veritas Dynamic Multipathing, when LUN sizes less than 400 MB are presented to HP StorageWorks Encryption SAN Switch for encryption,

a host panic may occur and this configuration is not supported in the Fabric OS 6.3.1 or later release.

- Hot Code Load from Fabric OS 6.4.1a to Fabric OS 7.0.0c is supported. Cryptographic operations and I/O are disrupted, but other layer 2 FC traffic is not disrupted.
- Relative to the HP StorageWorks Encryption SAN Switch and an HP StorageWorks DC SAN Backbone Director Switch / HP StorageWorks DC04 SAN Director Switch/ HP SN8000B 8-Slot SAN Backbone Director Switch, and the HP SN8000B 4-Slot SAN Director Switch with HP StorageWorks DC Switch Encryption FC Blade, all nodes in the Encryption Group must be at the same firmware level of Fabric OS 6.2 or later before starting a rekey or First Time Encryption operation. Make sure that existing rekey or First Time Encryption operations complete before upgrading any of the encryption products in the Encryption Group. And make sure that the upgrade of all nodes in the Encryption Group completes before starting a rekey or First Time Encryption operation.
- To clean up the stale rekey information for the LUN, use one of the following methods:
  - Method 1:
    1. Modify the LUN policy from `encrypt` to `cleartext` and commit. The LUN becomes disabled.
    2. Enable the LUN using `cryptocfg --enable –LUN`. Modify the LUN policy from `clear-text` to `encrypt` with `enable_encexistingdata` to enable the first time encryption and do commit. This clears the stale rekey metadata on the LUN and the LUN can be used again for encryption.
  - Method 2:
    1. Remove the LUN from Crypto Target Container and commit.
    2. Add the LUN back to the Crypto Target Container with LUN State=`clear-text`, policy=`encrypt` and `enable_encexistingdata` set for enabling the First Time Encryption and commit. This clears the stale rekey metadata on the LUN and the LUN can be used again for encryption.
- When disk and tape CTCs are hosted on the same encryption engine, re-keying cannot be done while tape backup or restore operations are running. Re-keying operations must be scheduled at a time that does not conflict with normal tape I/O operations. The LUNs should not be configured with auto rekey option when single EE has disk and tape CTCs.
- For new features added to encryption in Fabric OS 6.4.0, such as, disk device decommissioning, combined disk-tape encryption support on the same encryption engine, and redundant key ID metadata option for replication environments, all the nodes in the encryption group must be running Fabric OS 6.4.0 or later versions of Fabric OS. Firmware downgrade is prevented from Fabric OS 6.4.0 to an earlier version if one or more of these features are in use.

- Special Notes for HP Data Protector backup/restore application:
  - For the Tape Pool encryption policy specification on Windows Systems, HP Data Protector can be used with tape pool encryption specification only if the following pool label options are used (for other options, behavior defaults to Tape LUN encryption policy):
    - Pick from Barcode
    - User Supplied; no more than nine characters
  - On HP-UX systems, HP Data Protector cannot be used with tape pool encryption specification for any of the pool options. The behavior defaults to Tape LUN Encryption Policy.
  - For the Tape LUN encryption policy specification, no restrictions, tape LUN encryption policy specification can be used with HP Data Protector on HP-UX and Windows systems.
- HP StorageWorks Encryption SAN Switch/HP StorageWorks DC Switch Encryption FC Blade rejects the SCSI commands `write same` and `extended copy`, which are related to VAAI (vStorage APIs for Array Integration) hardware acceleration in vSphere 4.1. This results in non-VAAI methods of data transfer for the underlying arrays, and may affect the performance of VM related operations.

FCIP (HP DC SAN Director Multiprotocol Extension Blade, HP 1606 SAN Extension Switch and HP StorageWorks B-series Multi-protocol Router Blade)

- HP DC SAN Director Multiprotocol Extension Blade and HP StorageWorks B-series Multi-protocol Router Blade blades cannot coexist in an HP StorageWorks DC SAN Backbone Director Switch or an HP StorageWorks DC04 SAN Director Switch chassis.
- IPSec is supported on VE group 12 – 21 and not supported on VE group 22 – 31.
- IPSec is supported on FCIP tunnels that use only IPv4 connections.
- To enable IPSec, both ends of the tunnel must be running Fabric OS 7.0.0x.
- FICON networks with FCIP tunnels do not support DPS (aptpolicy 3) configurations. This applies to both emulating and non-emulating FCIP tunnels.
- Both ends of FICON emulating tunnels must run Fabric OS 7.0.0x.
- The maximum supported MTU size for the Brocade HP 1606 SAN Extension Switch/HP DC SAN Director Multiprotocol Extension Blade is 1500.
- FCIP connections are supported only between the HP 1606 SAN Extension Switch/HP DC SAN Director Multiprotocol Extension Blade and another HP 1606 SAN Extension Switch/HP DC SAN Director Multiprotocol Extension Blade. FCIP tunnels are not supported between the HP 1606 SAN Extension Switch/HP DC SAN Director Multiprotocol Extension Blade and the previous generation HP StorageWorks 400 Multi-protocol Router /HP StorageWorks B-Series Multi-protocol Router Blade platforms.
- When multiple FCIP tunnels are present on a switch and additional circuits (and the network bandwidth provided by those circuits) are added to an already active tunnel, there may be a short time where some frame loss can occur due to the process to re-fresh the internal FC frame routing tables in the switch. Therefore, additional circuits should be added only during low I/O periods utilizing the FCIP Tunnel being modified. In addition, if the circuit operation (addition/deletion) to the tunnel increases/decreases the total tunnel bandwidth, an FCIP Tunnel (VE port) disable/enable sequence should be performed after the addition/deletion of the circuit. This allows the switch to adjust the internal routes to utilize the new bandwidth fully.
- Switching modes between 10 Gbps and 1 Gbps is disruptive for FCIP traffic.
- The FCIP Circuit Keep alive timeout has a Fabric OS default value of 10000 ms (10 seconds). If FICON is configured, the recommended value is 1000 ms (1 second). The Keep Alive value

needs to be set based on the application needs. If the local and remote circuit configurations' Keep Alive Timeout values do not match, the tunnel uses the lower of the two configured values.

- The configured FCIP Circuit Keep Alive Timeout should be set to the same value on both ends of the FCIP connections.
- To perform the following operations, delete the FCIP configuration on the affected ports first:
  - Switching modes between 1 Gbps/10 Gbps/Dual
  - Moving VE/GE port between logical switches
  - Cleaning up the configuration before removing the blade
- Inband Management on the HP 1606 SAN Extension Switch or HP DC SAN Director Multiprotocol Extension Blade has the following restrictions:
  - Firmwaredownload over the Inband interface is not supported.
  - IPv6 addressing is not supported.
- Fabric OS 7.0.0x supports up to six 1 Gbps circuits on HP 1606 SAN Extension Switch and up to ten 1 Gbps circuits on HP DC SAN Director Multiprotocol Extension Blade per VE/FCIP Tunnel on 1 GbE interfaces. As a best practice, the FC-traffic through VE tunnel should not exceed recommended over-subscription guidelines. General guidelines are 2:1 over-subscription without compression (for example, 1 Gbps FC traffic over 500 Mbps tunnel) and 4:1 with compression.
- Any firmware activation disrupts I/O traffic on FCIP links.
- Under Traffic Isolation Zone, configurations with failover enabled, non-TI zone traffic uses the dedicated path if no other E or VE paths through the fabric exist, or if the non-dedicated paths are not the shortest paths. (A higher bandwidth tunnel with multiple circuits becomes the shortest path compared to a single tunnel).
- A VE/VEX Tunnel and E/EX FC port cannot connect to the same domain at the same time.
- Latency measurements supported on FCIP Tunnels are for 1 GbE & 10 GbE a 200 ms round trip time and 1% loss.
- HP 1606 SAN Extension Switch supports Optical and Copper Media types on GE0 and GE1 interfaces. Copper Media type is default on GE0/GE1 ports and does not support auto-sense functions.
- When GE0 and GE1 have copper media connected, auto-negotiation must be enabled on the other end of this port. The only speed that can be auto-negotiated with copper media is 1 Gbps.
- After inserting a 4 Gbps SFP in GE ports of an HP DC SAN Director Multiprotocol Extension Blade or HP 1606 SAN Extension Switch, sometimes `sfpshow` output might display `Cannot read serial data!` . Removing and re-inserting the SFP should resolve this issue. HP recommends that users perform `sfpshow` immediately after inserting the SFP and ensure SFP is seated properly before connecting the cables.
- When running Fabric OS 7.0.0a or later, if any of the following features are enabled in the FCIP configuration, a downgrade operation to pre-Fabric OS 7.0.0a is blocked until the features are removed from the FCIP configuration:
  - Inband Management
  - Multigigabit Circuit
  - Shared GE among Logical Switches
  - Auto-mode compression option
  - VE as XISL
  - 10 GigE lossless failover

- Modified QoS percentages
- 10 GigE ARL
- IP Configuration where multiple GigEs have same subnet values
- A tunnel configuration on 1GE ports that has more than 4 circuits
- Teradata emulation
- Circuits configured explicitly to be listeners or initiators

FCoE/CEE (HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch and HP DC SAN Director 10/24 FCoE Blade)

- When upgrading an HP 2408 24-10 GbE with 8-8 Gbps FC Base FCoE switch or an HP StorageWorks DC SAN Backbone Director Switch/HP StorageWorks DC04 SAN Director Switch with one or more HP DC SAN Director 10/24 FCoE Blades from Fabric OS 6.x to Fabric OS 7.0.0a or later, the user should carefully review Chapter 5 of the *Fabric OS 7.0.0 Converged Enhanced Ethernet Administrator's Guide*.
- Fabric OS 7.0.0x supports a new optimized model for provisioning FCoE with fewer configuration steps to enable FCoE on DCB ports. These changes do not allow the HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch to retain FCoE configuration information following an upgrade to Fabric OS 7.0.0c. After the upgrade to Fabric OS 7.0.0c, all FCoE edge ports must be provisioned with the new model before any FIP FLOGIs take place.
- Although including HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch in the path of TI (Traffic Isolation) and ETI (Enhanced Traffic Isolation) Zones is not prohibited, it is not supported. Configuring HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch in the TI/ETI Zone path is not recommended and results in undefined behavior.
- Ethernet L2 traffic with xSTP Hello timer set to less than or equal to 3 seconds may experience momentary traffic disruption during HA failover.
- The HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch balances the FCoE bandwidth across all six port groups (each port group contains four ports). To get optimum performance for FCoE traffic, HP recommends that the user distribute server CNA connections across these six port groups.
- Hot plugging a CP with firmware level earlier than Fabric OS 6.3.0 into an HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch with an active HP DC SAN Director 10/24 FCOE Blade results in the new standby CP not coming up.
- When operating in Converged Mode, tagged traffic on the native VLAN of the switch interface is processed normally. The host should be configured not to send VLAN tagged traffic on the switch's native VLAN.
- When operating in Converged Mode, tagged frames coming with a VLAN tag equal to the configured native VLAN are dropped.
- The Converged Network Adapter (CNA) may lose connectivity to the HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch/HP DC SAN Director 10/24 FCOE Blade if the CNA interface is toggled repeatedly over time. This issue is related to the CNA and rebooting the CNA restores connectivity.
- The HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch and HP DC SAN Director 10/24 FCOE Blade support only one CEE map on all interfaces connected to CNAs. HP does not recommend CEE map for use with non-FCoE traffic. HP recommends QoS commands for interfaces carrying non-FCoE traffic.
- Before upgrading to Fabric OS 7.0.0c, if the CEE map default value already exists, the same default value is preserved after upgrading to Fabric OS 7.0.0c. However, if the CEE map

default is not configured before upgrading to Fabric OS 7.0.0c, then after upgrading to 7.0.0c, the following CEE map default is created automatically:

  - cee-map default
  - priority-group-table 1 weight 40 pfc
  - priority-group-table 2 weight 60
  - priority-table 2 2 2 1 2 2 2 2

- When upgrading from Fabric OS 6.3.x or 6.4.x to Fabric OS 7.0.0c, the CEE start up configuration `dcf.conf` file is incompatible with the FCoE provisioning changes implemented in Fabric OS 7.0.0x. Users can save the `dcf.conf` file as a backup and apply it once the firmware upgrade is completed to get the HP StorageWorks DC SAN Backbone Director Switches and HP StorageWorks DC04 SAN Director Switches, to the same startup configuration as in the older release.
- HP recommends that Spanning Tree Protocol and its variants be disabled on CEE interfaces that are connected to an FCoE device.
- The Fabric Provided MAC Address (FPMA) and the FC Identifier (FCID) assigned to a VN_Port cannot be associated with any single front-end CEE port on which the FLOGI was received.
- LLDP neighbor information may be released before the timer expires when DCBX is enabled on a CEE interface. This occurs only when the CEE interface state changes from active to any other state. When the DCBX is not enabled, the neighbor information is not released until the timer expires, irrespective of the interface state.
- The FCoE Login Group Name should be unique in a fabric wide FCoE Login Management Configuration. The merge logic is designed to modify the Login Group Name during merge when Login group names in participating configurations conflict with each other. The current OUI being used by Brocade, while assigning the WWNs to HP 2408 FCoE Switches, HP StorageWorks DC SAN Backbone Director Switches and HP StorageWorks DC04 SAN Director Switches, would make only the last three bytes as different for any two HP 2408 FCoE Switches, HP StorageWorks DC SAN Backbone Director Switches or HP StorageWorks DC04 SAN Director Switches. Considering this assignment method, the merge logic would rename the login group by including the last three bytes of WWN in the login group name, so that they are unique in the merged configuration.
- For switches having different OUI indices from the eight assigned to Brocade WWNs can differ in more than three bytes. In this case, after normal merge and a rename according to the described logic, login group names can be the same for WWNs differing only in OUIs. The merge logic would drop one of the Login Groups to satisfy the requirement to keep the Login Group Name unique in the fabric wide configuration.
- Ethernet switch services must be explicitly enabled using the command `fosconfig –enable ethsw` before powering on an HP DC SAN Director 10/24 FCOE Blade. Failure to do so causes the blade to be faulted (fault 9). Users can enable `ethsw` after upgrading firmware without FC traffic interruption.
- The HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch does not support non-disruptive hot code loads (HCL). Upgrading the HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch to Fabric OS 7.0.0c or downgrading from Fabric OS 7.0.0c is disruptive to the I/O through the switch.
- Upgrading firmware on an HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch with one or more HP DC SAN Director 10/24 FCOE Blades from Fabric OS 6.3.x an v6.4.x to Fabric OS 7.0.0a or later is disruptive to any traffic through the HP DC SAN Director 10/24 FCOE Blades.

- Connecting HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch to an FCR-capable switch with fcrbcast config enabled causes a storm of broadcast traffic resulting in termination of `iswitchd`.
- When rebooting an HP StorageWorks DC SAN Backbone Director Switch or HP StorageWorks DC04 SAN Director Switch with an HP DC SAN Director 10/24 FCOE Blade, Qlogic CNA and LSAN zoning, the switch becomes very unresponsive for a period of time. This is due to the CNA sending excessive MS queries to the switch.
- The HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch and HP DC SAN Director 10/24 FCOE Blade can handle 169 small FCoE frames in bursts. If you are using the HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch or HP DC SAN Director 10/24 FCOE Blade, and you delete a large number of v-ports with HCM, some of the v-ports may not appear to be deleted. To correct this, disable and re-enable FCoE with the following CLI commands:
  - `switch:admin>fcoe –disable slot/port`
  - `switch:admin>fcoe --enable slot/port`
- When an HP DC SAN Director 10/24 FCOE Blade is powered off during configuration replay, the interface specific configuration does not get applied. Later when the HP DC SAN Director 10/24 FCOE Blade is powered on, all physical interfaces come up with default configurations. The user can execute the `copy startup-config running-config` command to apply the new configuration after powering on the HP DC SAN Director 10/24 FCOE Blade.
- When IGMP Snooping is disabled on a VLAN, all configured IGMP groups are removed from that VLAN. You must reconfigure the IGMP groups after enabling the IGMP snooping on that VLAN.

IMPORTANT: When upgrading from Fabric OS 6.3.x or 6.4.x to 7.0.0a or later, the CEE start up configuration `dcf.conf` file is incompatible with the FCoE provisioning changes implemented in Fabric OS 7.0.0a and later releases. Users can save the `dcf.conf` file as a backup and apply it once the firmware upgrade is completed to get the DCX/DCX-4S to the same startup configuration as in the older release.

FCR and Integrated Routing

- With routing and dual backbone fabrics, the backbone fabric ID must be changed to keep the IDs unique.
- When using FC Routing in a backbone to edge configuration with an Mi10K in the edge fabric, users may experience slow throughput for hosts attached to the Mi10K. Users may encounter this following a bounced IFL connection between the backbone and edge fabric. This slowdown can be resolved by disabling/enabling the Mi10K ports for the hosts that are impacted.
- Mi10K Directors operating with firmware earlier than M-EOSn 9.9.5 may experience repeated system faults when attached as an FCR edge switch to an HP 1606 SAN Extension Switch EX Port. To avoid this, ensure that the Mi10K is operating with M-EOSn 9.9.5 or later when in an edge fabric that is attached to an HP 1606 SAN Extension Switch FCR Backbone.
- VEX edge to VEX edge device sharing is not supported.
- To allow Hot Code Load on HP 8/40 Base 24-ports Enabled SAN Switch when using Integrated Routing, the edge switch connected to the HP 8/40 Base 24-ports Enabled SAN Switch must be running Fabric OS 6.1 or later code.

FICON

For FICON qualified releases, see "Additional Considerations for FICON Environments" (page 41) for details and notes on deployment in FICON environments. (This section is included only for releases that have completed FICON qualification).

FL_Port (Loop) Support

- FL_Port is not supported on HP SN8000B 16Gb 32-port FC Blade, HP SN8000B 16Gb 48-port FC Blade, and the HP SN6000B 16Gb FC Switch.
- The HP StorageWorks SAN Director 48-port 8Gb FC Blade and HP StorageWorks DC SAN Director 64-port 8Gb FC Blade support attachment of loop devices.

  Virtual Fabrics must be enabled on the chassis and loop devices and may be attached only to ports on a 48-port or 64-port blade assigned to a non-Default Logical Switch operating with the default 10-bit addressing mode (they may not be in the default Logical Switch).
- A maximum of 144 ports may be used for connectivity to loop devices in a single logical switch within a chassis in 10-bit dynamic area mode on HP StorageWorks DC04 SAN Director Switch.
- A maximum of 112 ports may be used for connectivity to loop devices in a single logical switch within a chassis in 10-bit dynamic area mode on HP StorageWorks DC SAN Backbone Director Switch .
- Loop devices continue to be supported when attached to ports on the HP StorageWorks SAN Director 16-port 8Gb FC Blade and the HP StorageWorks SAN Director 32-port 8Gb FC Blade with no new restrictions.

ICLs on HP StorageWorks DC SAN Backbone Director Switch /HP StorageWorks DC04 SAN Director Switch

- If an HP StorageWorks DC SAN Backbone Director Switch with an 8-link ICL license is connected to an HP StorageWorks DC SAN Backbone Director Switch with a 16-link license, the HP StorageWorks DC SAN Backbone Director Switch with the 16-link license reports enc_out errors. The errors are harmless, but continue to increment. These errors are not reported if an HP StorageWorks DC SAN Backbone Director Switch with a 16-link license is connected to an HP StorageWorks DC04 SAN Director Switch with only 8-link ICL ports.
- If ICL ports are disabled on only one side of an ICL link, the enabled side may see enc_out errors.

Native Connectivity (M-EOS interoperability)

A switch running Fabric OS 7.0.0x cannot form E_Port connectivity with any M-EOS platform. A switch running Fabric OS 7.0.0x can operate only in Brocade native mode (interopmode 0). Connectivity between M-EOS platforms and a switch running Fabric OS 7.0.0x is supported via FCR only.

Port Mirroring

- On the HP 8/80 Base 48-ports Enabled SAN Switch, the port mirroring feature has a limitation where all port mirror resources must stay within the same ASIC port group. The resources are the configured mirror port, Source Device, and Destination Device or ISL, if the Destination Device is located on another switch. The ASIC port groups are 0-15, 16-31, 32-47, 48-63, and 64-79. The routes are broken if the port mirror resources are spread across multiple port groups.
- Port Mirroring is not supported on the Brocade HP 1606 SAN Extension Switch.

Virtual Fabrics

- When creating logical fabrics that include switches that are not virtual fabrics capable, it is possible to have two logical switches with different FIDs in the same fabric connected via a VF incapable switch. Extra caution should be used to verify the FIDs match for all switches in the same Logical Fabric.
- A switch with virtual fabrics enabled may not participate in a fabric that is using Password Database distribution or Administrative Domains. The virtual fabrics feature must be disabled prior to deploying in a fabric using these features.

Zoning

- There are limitations to zoning operations that can be performed from a Fabric OS 6.x switch that is in the same fabric as a Fabric OS 7.0.0c switch if the Fabric OS 6.x switch is not running the recommended firmware version. See the Fabric OS Interoperability section for details.

  Beginning with the Fabric OS 6.2.0 release, all WWNs containing uppercase characters are automatically converted to lowercase when associated with a zone alias and stored as part of a saved configuration on a switch. For example, a WWN entered as either AA.BB.CC.DD.EE.FF.GG.HH or aa.bb.cc.dd.ee.ff.gg.hh when associated with a zone alias is stored as aa.bb.cc.dd.ee.ff.gg.hh on a switch operating with Fabric OS 6.2.0 or later.

  This behavioral change in saved zone alias WWN members does not impact most environments. However, in a scenario where a switch with a zone alias WWN member with uppercase characters (saved on the switch with pre-Fabric OS 6.2.0 code) is merged with a switch with the same alias member WWN in lowercase characters, the merge fails, since the switches do not recognize these zoning configurations as being the same.

  For additional details and workaround solutions, see the latest Fabric OS Admin Guide updates or contact Customer Support.

Miscellaneous

- RASlog message AN-1010 may be seen occasionally indicating `Severe latency bottleneck detected`. Even though it is a Warning message, it is likely to be a false alarm and can be ignored.
- POST diagnostics for the HP 8/40 Base 24-ports Enabled SAN Switch have been modified beginning with Fabric OS 6.3.1b and 6.4.0 to eliminate an `INIT NOT DONE` error at the end of an ASIC diagnostic port loopback test. This modification addresses BL-1020 Initialization errors encountered during the POST `portloopbacktest`.
- It is important to note that the outputs of `slotshow -p` and `chassishow` commands also display the maximum allowed power consumption per slot. These are absolute maximum values and should not be confused with the real-time power consumption on 16 Gbps blades. The `chassisshow` command has a Power Usage (Watts): field that shows the actual power consumed in real-time on 16 Gbps blades.
- Class 3 frames that have been trapped to CPU are discarded in the following scenarios on HP StorageWorks DC SAN Backbone Director Switch /HP StorageWorks DC04 SAN Director Switch/HP SN8000B 8-Slot SAN Backbone Director Switch and the HP SN8000B 4-Slot SAN Director Switch during the following conditions:
  - HA failover on HP StorageWorks DC SAN Backbone Director Switch /HP StorageWorks DC04 SAN Director Switch/HP SN8000B 8-Slot SAN Backbone Director Switch and the

HP SN8000B 4-Slot SAN Director Switch platforms while running Fabric OS 7.0.0a or later firmware

- Firmware upgrade from Fabric OS 7.0.0a to a later release on HP 8/8 Base (0) E_Port SAN Switch, HP 8/40 Base 24-ports Enabled SAN Switch, HP 8/80 Base 48-ports Enabled SAN Switch, and the HP SN6000B 16Gb FC Switch.

- The QSFP information in the `sfpshow` output indicates the ID field as all zeros. This is as designed:

  ```
  ras080:FID128:root> sfpshow 5/32
  QSFP No: 8 Channel No:0
  Identifier:  13   QSFP+
  Connector:   12   MPO Parallel Optic
  Transceiver: 0000000000000000 16_Gbps  id
  ```

- HP recommends that for directors with more than 300 E_Ports, the switch be disabled prior to executing the `switchCfgTrunk` command (used to disable or enable trunking on the switch).
- During non-disruptive firmware upgrades, E_Ports in R-RDY mode may cause some frame drops on the E_Port links.
- For the `configure` command, in Fabric OS 6.4, or later, the default value that displays for Maximum Logins per switch is different from the value that displays in Fabric OS 6.3.x. The default value has not changed; it was displayed incorrectly in Fabric OS 6.3.x, and is now corrected.
- HP StorageWorks B-series switch Fill Word setting and link initialization command is no longer valid. With Fabric OS 7.0.0x, switches automatically determine the correct login sequence.
- HP Network Advisor 11.1 is required for management of any switch running Fabric OS 7.0.0x. Since DCFM is unable to discover and manage switches running Fabric OS 7.0.0x, customers must upgrade from DCFM to HP Network Advisor prior to upgrading any switches to Fabric OS 7.0.0x.
- The Fabric OS 7.0 Doc Update Document, which includes information on documentation updates, and is available on hp.com.
- Instructions for changing the default setting in Fabric OS to accommodate the Avago watchdog timer are detailed in the Fabric OS 7.0 Doc Update Document. For a complete description on this process, see the document posted on hp.com.
- After a firmware downgrade from Fabric OS 7.0.0x to 6.4.1x, ports are logged in as G_Port on an EVA 4400.
- Ports are logged in as G_Ports after changing the port speed to 2 Gbps on an HP StorageWorks DC SAN Backbone Director Switch.

Fabric OS feature compatibility in native connectivity modes

Some earlier versions of Fabric OS supported E_Port connectivity with M-EOS-based products. With the introduction of HP Network Advisor, DCFM has been put into sustaining mode.

Recommended Migration Paths to Fabric OS 7.0.0c

Migrating from Fabric OS 6.4.x

HP StorageWorks DC SAN Backbone Director Switch/HP StorageWorks DC04 SAN Director Switch units running any Fabric OS 6.4.x release can be non-disruptively upgraded to Fabric OS 7.0.0c.

Any 8 Gbps platforms (other than HP StorageWorks DC SAN Backbone Director Switch/HP StorageWorks DC04 SAN Director Switch) using a Fabric OS version earlier than Fabric OS

6.4.1a must upgrade to Fabric OS 6.4.1a or later before non-disruptively upgrading to Fabric OS 7.0.0c.

IMPORTANT: Upgrading these platforms from any Fabric OS 6.4.x release earlier than Fabric OS 6.4.1a to Fabric OS 7.0.0c will cause disruption to FC traffic. Upgrading any 8 Gbps platform operating at Fabric OS 6.4.1a or later to Fabric OS 7.0.0c is non-disruptive to FC traffic.

Migrating from Fabric OS 6.3.x

To non-disruptively migrate from Fabric OS 6.3.x to 7.0.0c, units should first load Fabric OS 6.4.1a (Fabric OS 6.4.1b should be used for encryption platforms, units operating in Access Gateway mode, or units with ports configured as EX or VEX for FCR), and then migrate to Fabric OS 7.0.0c.

Fabric OS Upgrade and Downgrade Special Considerations

The HP StorageWorks DC SAN Backbone Director Switch/HP StorageWorks DC04 SAN Director Switch units running any Fabric OS 6.4.x can be non-disruptively upgraded to Fabric OS 7.0.0c. This upgrade is non-disruptive to FC traffic only. However, there will be FCoE traffic disruption when loading Fabric OS 7.0.0c and Network Advisor 11.1.1 on a DC SAN Backbone Director switch with an HP DC SAN Director 10/24 FCoE Blade installed, even though there is no warning flagging the FCoE traffic disruption.

Non-disruptive upgrade to Fabric OS 7.0.0c on 8 Gbps switches is allowed from Fabric OS 6.4.1a or later.

Disruptive upgrades to Fabric OS 7.0.0c are allowed and supported from Fabric OS 6.3 (up to a two-level migration) using the optional `-s` parameter with the `firmwaredownload` command. If there are multiple node EGs (encryption groups) in a fabric, complete `firmwaredownload` on one node at a time before downloading on another node.

The HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch does not support non-disruptive hot code loads (HCL). Upgrading the HP 2408 24-10 GbE w/8-8 Gbps FC Base FCoE Switch to Fabric OS 7.0.0c is disruptive to the I/O through the switch.

FC FastWrite , EX_Ports, and TCP byte streaming on HP StorageWorks B-Series Multi-protocol Router Blade must be disabled prior to upgrading to Fabric OS 7.0.0c. Failure to do so causes the upgrade to be blocked.

Upgrading a switch currently operating in interopmode 2 or 3 to Fabric OS 7.0.0c is disruptive. The interopmode must be changed to 0 prior to upgrading to Fabric OS 7.0.0c; interopmodes 2 and 3 are not supported on Fabric OS 7.0.0c. Changing the interopmode is an offline operation.

Firmware upgrade instructions

IMPORTANT: HP recommends that you upgrade to Fabric OS 7.0.0c as soon as possible to take advantage of the fixes and new features.

To access the latest Fabric OS 7.0.0c firmware, configuration files, and MIB files, see the HP website:

http://www.hp.com/support/downloads

On the website:

1. Under Storage, select **Storage Networking**.
2. Select the link for the appropriate switch, select your product, and then select **Cross operating system (BIOS, firmware, Diagnostics, etc.)**.
3. Select **Firmware**.

4. Select **V7.x Firmware** for HP StorageWorks B-series FC Switches for Fabric OS 7.0.0c.
   - To download the firmware, click **Download**.
   - To read the release notes, click the **Release Notes** tab.

To verify that the firmware download is complete, enter the `firmwareDownloadStatus` command on the switch, verify that the process is complete, and then proceed to the next switch.

Scalability

For details on supported scalability, see the *HP StorageWorks SAN Design Reference Guide*, available on the HP website:

http://www.hp.com

Encryption — additional recommendations

- HP recommends that the Crypto Target Containers (CTC) be created when all of the nodes/encryption engines (EEs) in the Data Encryption Key (DEK)/High Availability Cluster (HAC) are up and enabled.
- LUN configuration
  - To configure a LUN for encryption:
    - Add the LUN as clear-text to the Crypto Target Container (CTC).
    - When the LUN comes online and the clear-text host I/O starts, modify the LUN from clear-text to encrypted, including the `enable_encexistingdata` option to convert the LUN from clear-text to encrypted.
  - An exception to this LUN configuration process: If the LUN was previously encrypted by the HP Encryption Switch or HP Encryption Blade, the LUN can be added to the CTC with the `-encrypt` and `-lunstate ="encrypted"` options.
  - LUN configurations must be committed to take effect. No more than 25 LUNs can be added or modified in a single commit operation. Attempts to commit configurations that exceed 25 LUNs fail with a warning. There is also a five-second delay before the commit operation takes effect.

    Always ensure that any previously committed LUN configurations or LUN modifications have taken effect before committing additional LUN configurations or additions. All LUNs should be in an Encryption Enabled state before committing additional LUN modifications.
- LUN Size Expansion consideration (as an example for EVA LUNs): When an EVA LUN is encrypted, and then needs to be expanded using HP Command View, no additional configuration is required from the Encryption SAN Switch side. However, make sure not to change the LUN size while any re-key operation is in progress.
- If an HA Cluster is configured within an Encryption Group with containers configured for auto failback mode, care must be taken to change the failback mode to "manual" before a firmware upgrade; this can be set back to "auto" once upgrade is done. See the *Fabric OS Encryption Administrator's Guide v7.0* for additional recommendations and precautions to be followed during this process.
- Avoid changing the configuration of any LUN that belongs to a CTC/LUN configuration while the rekeying process for that LUN is active. If you change the LUN settings during manual or auto, rekeying or First Time Encryption, the system reports a warning message stating that the encryption engine is busy and a forced commit is required for the changes to take effect. A forced commit command halts all active rekeying processes running in all CTCs and corrupts any LUN engaged in a rekeying operation. There is no recovery for this type of failure.
- If the data encryption group (Encryption Group) gets into a state where the Group Leader encryption switch reports that another encryption switch is NOT a member node of the

encryption group, and the encryption switch member node still indicates that it IS part of the encryption group, the following recovery action can be performed to re-merge the nodes into the encryption group:

1. On the Group Leader encryption switch, execute the CLI `cryptocfg –dereg –membernode <WWN of member node>` command.
2. Wait for 30 seconds.
3. Execute the CLI `cryptocfg –reg –membernode <WWN membernode> <certificate file name> <ipaddr of member node>` command.

This is a rare situation that has been noted in a test environment where there were intermittent management network connectivity problems.

- To remove access between a given initiator and target, you must not only remove the active zoning information between the initiator and target, but must also remove the associated CTCs, which in turn removes the associated frame redirection zone information. Make sure to back up all data before taking this action.
- Before committing configurations or modifications to the CTC or LUNs on an HP Encryption Switch or HP Encryption Blade, make sure that there are no outstanding zoning transactions in the switch or fabric. Failure to do so results in the commit operation for the CTC or LUNs failing and may cause the LUNs to be disabled. The user can check for outstanding zoning transactions by issuing the CLI `cfgtransshow` command :

```
DCX_two:root> cfgtransshow
There is no outstanding zoning transaction
```

- Each LUN is uniquely identified by the HP Encryption Switch or HP Encryption Blade using the LUN serial number. The LUN serial numbers must be unique for LUNs exposed from the same target port. The LUN serial numbers must also be unique for LUNs belonging to different target ports in nonmultipathing configurations. Failure to ensure unique LUN serial numbers results in nondeterministic behavior and may result in faulting of the HP Encryption Switch or HP Encryption Blade.
- When creating an HA cluster or EG with two or more HP Encryption Switch/Encryption Blades, the GE ports (I/O sync links) must be configured with an IP address for the `eth0` and `eth1` Ethernet interfaces using `ipaddrset`. In addition, the `eth0` and `eth1` Ethernet ports should be connected to the network for redundancy. These I/O sync links connections must be established before any Re-Key, First Time Encryption, or enabling EE for crypto operations. Failure to do so results in HA Cluster creation failure. If the IP address for these ports is configured after the EE was enabled for encryption, HP Encryption Switch needs to be rebooted and Encryption Blades should be `slotpoweroff/slotpoweron` to sync up the IP address information to the EEs. If only one Ethernet port is configured and connected to a network, data loss or suspension of Re-Key may occur when the network connection toggles or fails.
- `initEE` removes the existing master key or link key. Backup the master key by running `cryptocfg –exportmasterkey` and `cryptocfg –export –currentMK` before running `initEE`. After `initEE`, `regEE` and `enableEE`, run `cryptocfg –recovermasterkey` to recover the master key previously backed up, or in the case of fresh install run `cryptocfg – genmasterkey` to generate a new master key. If you are using SKM/ESKM, establish a trusted link with SKM/ESKM again. Certificate exchange between key vaults and switches are not required in this case.
- The disable EE interface CLI `cryptocfg --disableEE [slot no]` should be used only to disable encryption and security capabilities of the EE from the Fabric OS Security Admin in the event of a security compromise. When disabling the encryption capabilities of the EE using the noted commands, the EE should not be hosting any CTCs. Ensure that all CTCs hosted on the HP Encryption Switch or HP Encryption Blade are either removed or moved to a different EE in the HA Cluster or EG before disabling the encryption and security capabilities.

- Whenever `initNode` is performed, new certificates for CP and KAC (SKM/ESKM) are generated. Hence, each time `InitNode` is performed, the new KAC Certificate must be exported and signed by SKM/ESKM. Without this step, errors occur, such as key vault not responding and ultimately key archival and retrieval problems.
- The HTTP server should be listening to port 9443. SKM/ESKM is supported only when configured to port 9443.
- Configuring a Brocade group on SKM/ESKM: As described in the *Fabric OS Encryption Administrator's Guide*, a Brocade group needs to be configured on SKM/ESKM (under Local Users and Groups) for managing all keys generated by Brocade encryption switches and blades. It is important to note that the name for this group is case sensitive and must be "brocade," not "Brocade."
- The `–key_lifespan` option has no effect for `cryptocfg –add –LUN`, and only has an effect for `cryptocfg --create –tapepool` for tape pools declared `-encryption_format native`. For all other encryption cases, a new key is generated each time a medium is rewound and block zero is written or overwritten. For the same reason, the **Key Life** field in the output of `cryptocfg --show -container -all –stat` should always be ignored, and the **Key Life** field in `cryptocfg --show –tapepool –cfg` is significant only for native-encrypted pools.
- In a DC SAN Director or DC04 SAN Director with Fabric OS 6.3.1x and DC Switch encryption FC blades installed, you must set the quorum size to zero and disable the system card on the blade prior to downgrading to a Fabric OS version earlier than 6.3.0.
- The System Card feature requires DCFM 10.3.0 or later or HP Network Advisor. Note that all nodes in the EG must be running Fabric OS 6.3.0 or later for system verification to be properly supported.
- The Encryption SAN Switch and Encryption FC blade do not support QoS. When using encryption or Frame Redirection, participating flows should not be included in QoS Zones.
- HP encryption devices can be configured for either disk or tape operation. However, encryption FC blades can be configured to support different media types within a common DC SAN Director/ DC04 SAN Director chassis. The ability to configure multiple Crypto-Target Containers defining different media types on a single encryption engine (Encryption SAN Switch or Encryption FC blade) is supported beginning with Fabric OS 6.4.0.
- When the tape key expires in the middle of write operation on the tape, the key is used to append the data on the tape media. When the backup application rewinds the media and starts writing to Block-0 again (and if the key is expired), a new key is created and used henceforth. The expired key is then marked as read only and used only for restoring data from previously encrypted tapes.
- Note that the disk device decommission functionality is not currently supported with SKM/ESKM.
- SKM/ESKM FIPS Mode Enablement

  FIPS compliance mode is disabled in SKM/ESKM by default. To enable it, follow the procedure described in the SKM/ESKM user guide, "Configuring the Key Manager for FIPS Compliance" section.

  NOTE: Per FIPS requirements, you cannot enable or disable FIPS when there are keys on the Key Manager. Therefore, if FIPS enablement is required, HP strongly recommends that it be performed during the initial SKM/ESKM configuration, before any key sharing between the switch and the SKM/ESKM occurs.

- SKM/ESKM dual node cluster - Auto failover considerations:

  In a dual node SKM/ESKM cluster configuration with the encryption switch, ensure that the two SKM/ESKM nodes are always available and online for proper key archival. If one of the SKM/ESKM nodes fails, you cannot use the configuration to create new keys. In other words,

adding new targets or LUNs to the encryption path will not work until both the SKM/ESKM nodes are available. However, there will not be any issue for retrieving keys or using the existing setup as long as one SKM/ESKM node is available.

The encryption switch makes sure that any new KEY is hardened (archived) to both SKM/ESKM Key Vaults in the SKM/ESKM Cluster before the key gets used for encryption. In the event that one of the SKM/ESKM vaults is down, the key creation will fail because of the hardening check failure. As a result, the new key creation operation will not function. For Key retrieval, this is not the requirement and any one Key Vault being online will get the Key as long as that Key Vault has the Key.

- Auto rekeying of encrypted disk LUNs may be delayed when an encryption engine reboots or when HAC failover/failback occurs. Should either of these events delay auto rekeying, use the `cryptocfg –manual_rekey` command to manually start the rekeying of the affected LUNs.

Initial setup of encrypted LUNs

IMPORTANT: While performing first-time encryption to a LUN with more than one initiator active at the time, rekey operations slow to a standstill. Define LUNs for a single initiator at a time to avoid this occurrence.

NOTE: When configuring multipath LUNs, care should be taken to add LUN 0 on all of the paths, subject to the following considerations:

- If LUN 0 presented by the back-end target is a controller LUN (not a disk LUN; that is, not visible in the `discoverLUN` output), add LUN 0 to the container as a clear text LUN for any multi-path configuration. Make sure all of the paths have this LUN 0 added for MPIO operation (EVA configuration, for example).
- If LUN 0 presented by the back-end target is a disk LUN, LUN 0 can be added to the container either as clear text or encrypted (MSA configuration, for example).
- For HP-UX, LUN 0 can appear as 0x0 or 0x400, but both of them are LUN 0 only and should be treated alike.

Additional Considerations for FICON Environments

Not all possible combinations of features and hardware configurations are included in the FICON qualification process. Features and hardware configurations not supported for FICON may be supported for Open Systems environments. This section describes those features and configurations tested for FICON environments and includes supplemental information for users deploying Fabric OS-based platforms in FICON environments.

- Multiple 10 Gbps ISLs and FCIP links can load-share between cascaded FICON directors/switches but do not load balance in a FICON configuration.
- The 10-bit addressing mode is not supported in a FICON environment.
- See the “Fabric OS Upgrade and Downgrade Special Considerations” section of the release notes when planning an upgrade to a fabric that includes the HP 1606 SAN Extension Switch or has any HP DC SAN Director Multiprotocol Extension Blade in an HP StorageWorks DC

SAN Backbone Director, HP StorageWorks DC04 SAN Director Switch, or HP SN8000B SAN Director switches.

Area	Comments
Cascading	There are special configuration considerations for environments with three or more switches (domain IDs) in a FICON fabric. Seek assistance from service support to ensure proper configuration.
Cascading	Fiber ICL configurations (with HP SN8000B SAN Directors) supported for FICON are the same as the supported configurations for copper ICLs (with HP StorageWorks DC SAN Backbone Director and HP StorageWorks DC04 SAN Director).
Cascading	Encryption and compression is supported on IP links but not on Fibre Channel ISLs.
CUP	The switch name is replaced with underscores (____) after the first time CUP (FMS mode) is enabled. Use the switch configuration panels to reset the switch name.
FCIP	VEX ports are not supported on the HP 1606 SAN Extension Switch and HP DC SAN Director Multiprotocol Extension Blade in a FICON environment.
FCIP	When performing multiple cabling changes to the SAN fabric in a FICON Emulating FCIP Tunnel configuration with the HP 1606 SAN Extension Switch or HP DC SAN Director Multiprotocol Extension Blade, either disable all of the FCIP Tunnels or issue the switch disable command on all FCIP interconnected switches to avoid IFCCs in a mainframe environment. Issuing either a switch disable or an FCIP Tunnel disable command allows the FCIP FICON Emulation processing state-machine to execute an orderly cleanup process and allow normal activation of the new configuration. When all cabling and Traffic Isolation Zone manipulations have been completed, enable the switches or the FCIP Tunnels.
FCIP	A disabled XGE or GE port is re-enabled after a code upgrade/downgrade. To prevent XGE/GE ports from being re-enabled after a code load they should be persistently disabled.
Firmware Downloads	Non-disruptive Hot Code Load is supported only on director class switches (HP StorageWorks DC SAN Backbone Director, HP StorageWorks DC04 SAN Director Switch, or HP SN8000B SAN Director switches. Comprehensive non-disruptive Hot Code Load is not supported on the HP 1606 SAN Extension Switch or HP StorageWorks DC SAN Backbone Director, HP StorageWorks DC04 SAN Director Switch, or HP SN8000B SAN Director switches with an HP DC SAN Director Multiprotocol Extension Blade since the FCIP tunnels will go down for 10-15 seconds and all traffic in the tunnels will be disrupted. IFCCs may result if traffic is not stopped while downloading firmware.
Firmware Downloads	The CUP device must be varied offline to all MVS partitions before starting a code load. The CUP device can be varied back online after the code load completes. Failure to vary off the CUP devices may result in missing interrupt.
Interoperability	When connecting an 8 Gbps or 16 Gbps capable port in a switch to an IBM Virtualization Engine TS7700, the port must be configured to a minimum of 16 buffers to avoid IFCCs at the channel and loss of FICON paths to the control unit. This requires the Extended Fabric license on the switch.
Manageability	Port Fencing should be used to avoid taking ports down for normal fabric events. The recommended fencing criteria and settings are listed in Table 7 (page 43). **NOTE:** Port fencing should not be set for C3 discards.
Manageability	As a best practice for deploying Fabric OS switches and directors into a FICON environment, verify the Fabric OS version shipped with the most current Fabric OS recommendation. HP recommends you update all Fabric OS switches and directors to the same Fabric OS levels for production.
Manageability	FMS must be enabled on the local switch for the remote CUP to work.
Manageability	The FICON merge wizard feature in HP Network Advisor cannot be used to merge an HP StorageWorks 4/256 SAN Director with an HP StorageWorks DC SAN Backbone Director, HP StorageWorks DC04 SAN Director Switch, or HP SN8000B SAN Director switches.
Manageability	When setting insistent domain ID on a switch using the FICON Configuration Wizard, the switch is always taken offline and insistent domain ID set, even if insistent domain ID is already set.

Area	Comments
Optics	When configuring interswitch links (ISLs) between a 16 Gbps platform and an 8 Gbps platform, the ISL ports must be configured for E_Port only.
Serviceability	FPGA version 0x1C on the HP DC SAN Director Multiprotocol Extension Blade is not supported with Fabric OS 7.0.0c. The FPGA version can be checked by issuing the `bladevershow` command.
Serviceability	zDAC may not give reliable results. The SIOCA tool run from HMC on System z performs a similar function and therefore may not give reliable results as well.
Serviceability	When using HP Network Advisor to upgrade/downgrade code, in some instances the status bar is not updated and left blank. If the status bar is blank, use the Fabric OS `firmwaredownloadstatus` command to validate the status of code upgrade/downgrades.
Traffic Isolation Zones	Under certain circumstances, enabling multiple Traffic Isolation Zones with failover disabled may cause some frames to be dropped due to the timing when paths are re-routed while the zones are being implemented. To avoid this, all Traffic Isolation Zones should be enabled with failover enabled first, so that all desired routes are established.
Traffic Isolation Zones	Seek assistance from service support before attempting to configure and enable this feature.
Virtual Fabrics	Seek assistance from service support before attempting to enable Virtual Fabrics or use the XISL (Base Switch ISL) capability.
Virtual Fabrics	If a port gets assigned a port address of 0xFE in an Open System logical switch, an RSCN is sent by Fabric OS on behalf of port address 0xFE during CP failover or firmware download. This may result in an IFCC for any FCP channel running traffic to port address 0xFE.

Table 7 Recommended fencing criteria

Criteria	Value
ITW (Invalid Transmission Words)	25 per minute
CRC (Cyclical Redundancy Check)	3 per hour
Protocol Errors	2 per minute
State Change	7 per minute
Link Reset	3 per minute

Interoperability

When cascaded to other switches, referred to as a *fabric*, all switches in the fabric must be at Fabric OS 6.4.2a before upgrading to Fabric OS 7.0.0c. Interoperability between switches at Fabric OS 6.4.2a and 7.0.0c is supported. However, the recommended best practice is to have all switches in the same fabric at the same code level.

The next section indicates supported intra-fabric interoperability between hardware platforms, supported management software levels, and recommended firmware versions.

FICON hardware/firmware/software interoperability with Fabric OS 7.0.0c

Interoperability is supported with Fabric OS 7.0.0c between the following platforms:

- HP StorageWorks DC SAN Backbone Director Switch
- HP StorageWorks DC04 SAN Director Switch
- HP SN8000B 8-Slot SAN Backbone Director Switch
- HP SN8000B 4-Slot SAN Director Switch
- HP 8/80 48-ports Enabled SAN Switch

- HP 8/40 24-ports Enabled SAN Switch
- HP 1606 SAN Extension Switch

All platforms operating with Fabric OS 7.0.0c must be managed with HP B-series Network Advisor 11.1.2 or later.

The following platforms using Fabric OS 6.4.2a may also interoperate in a fabric with switches running Fabric OS 7.0.0c:

- HP StorageWorks DC SAN Backbone Director Switch
- HP StorageWorks DC04 SAN Director Switch
- HP 8/80 48-ports Enabled SAN Switch
- HP 8/40 24-ports Enabled SAN Switch
- HP 1606 SAN Extension Switch
- HP StorageWorks 4/256 SAN Director

Platforms operating with Fabric OS 6.4.2a may be managed with either DCFM 10.4.5a or HP B-series Network Advisor v11.1.2 or later.

The following platforms are not supported for interoperability in fabrics with switches using Fabric OS 7.0.0c:

- StorageWorks Director 2/140 (M6140)
- Mi10K
- HP StorageWorks 400 Multi-protocol Router

Table 8 (page 44) shows supported blade types in an HP StorageWorks DC SAN Backbone Director Switch, HP StorageWorks DC04 SAN Director Switch, HP SN8000B 8-Slot SAN Backbone Director Switch, and HP SN8000B 4-Slot SAN Director Switch.

Table 8 Supported blade types

Blade Type	HP StorageWorks DC04 SAN Director Switch	HP StorageWorks DC SAN Backbone Director Switch	HP SN8000B 4-Slot SAN Director Switch	HP SN8000B 8-Slot SAN Backbone Director Switch
HP SN8000B 16Gb 32-port Fibre Channel Blade	Not supported	Not supported	Supported	Supported
HP SN8000B 16Gb 48-port Fibre Channel Blade[1]	Not supported	Not supported	Supported	Supported
HP StorageWorks SAN Director 16-port 8Gb FC Blade	Supported	Supported	Not supported	Not supported
HP StorageWorks SAN Director 32-port 8Gb FC Blade	Supported	Supported	Not supported	Not supported
HP StorageWorks SAN Director 48-port 8Gb FC Blade[1]	Supported	Supported	Not supported	Not supported
HP StorageWorks DC SAN Director 64-port 8Gb FC Blade[2]	Supported	Supported	Not supported	Not supported
HP DC SAN Director Multiprotocol Extension Blade	Supported	Supported	Supported	Supported

[1] All ports from a 48 port card must be assigned to a logical switch with zero-based addressing configured. They must be in a logical switch other than the default switch.

[2] Supported only in a logical switch that will not have any FICON traffic. This is for FCP traffic only.

Any blade not listed in Table 8 (page 44) above is not supported in a chassis that carries FICON traffic.

Fabric OS 7.0.0 fixes

Table 9 (page 45) lists defects closed in the Fabric OS 7.0.0 firmware release.

Table 9 Fabric OS 7.0.0 closed defects

Closed fixes summary	Solution
Removing an active CP from a fully populated HP StorageWorks 4/256 SAN Director switch (which is 384 F-ports) causes some FC_Port blades to reinitialize and possible frame drops.	**Workaround prior to upgrade:** Before HA failover starts, make sure the response trap installed on the ports have been cleaned up. Fixed in Fabric OS 7.0.0.
Stress on the fabric involving slot power cycling of all the blades in sequence with CP HA Failover results in CP panic and termination of process fwd.	Fixed in Fabric OS 7.0.0
After changing native VLAN on a converged mode port, the HP 2408 FCoE Switch reports VLAN has changed, but traffic capture shows that both old and new VLANs are now native VLANs on that port.	**Workaround prior to upgrade:** Remove the Native-VLAN from the tagged list before changing it. Fixed in Fabric OS 7.0.0.
Scalability stress may cause NSD to panic and crash on a HP StorageWorks 4/32 SAN Switch when enabling zoning with Top Talkers enabled.	Fixed in Fabric OS 7.0.0.
In a FICON environnent, Port faults are logged continuously when switchenable is followed directly by fmsenable where fmsenable is being invoked before the F-Ports have had a chance to come online.	Fixed in Fabric OS 7.0.0.
Random errors occur while performing Access Gateway F-N port mapping operations from WebTools.	Fixed in Fabric OS 7.0.0.
EVMD panics due to message queue full on standby CP during logical switch creation. Customers may experience HA Failover, but there is no disruption in functionality when this occurs.	**Workaround prior to upgrade:** Create logical switches with SMIA disabled. Fixed in Fabric OS 7.0.0.
In a large scale fabric with multiple VEx ports or non-trunked Ex-Ports to the same edge fabric, an FCR device import processing logic is duplicated for each port and takes a long time to complete for all devices. This may cause delays in hosts discovering all targets over the IFLs and devices could be stuck in the initialization state after the switchdisable/enable transition.	**Workaround prior to upgrade:** Perform a switch disable/enable on switches where the targets are attached. Fixed in Fabric OS 7.0.0.
When many devices are attempting to login simultaneously, FDISCs on NPIV devices may be rejected for a period of time due to lack of internal resources.	Fixed in Fabric OS 7.0.0.
In an encryption environment, boot over SAN may fail when there is no connection to the key vault.	Fixed in Fabric OS 7.0.0.
Proxy device showing as imported in fcrproxydevshow but absent from nsallshow.	**Workaround prior to upgrade:** Reboot the switch. Fixed in Fabric OS 7.0.0.
Access Gateway is not displayed by the DCFM client when utilizing an EOS seed switch.	**Workaround prior to upgrade:** Switch offline/online or restart AG. Fixed in Fabric OS 7.0.0.
Adding a new ISL or performing other events that trigger route change may cause connectivity between servers and devices to bel ost.	Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
On an HP StorageWorks 4/256 SAN Director running Fabric OS 6.4.0a or later, an unstable link triggers a continuous timeout/discard frame/unroutable frame tracing causing the CPU to be too busy to process requests.	Fixed in Fabric OS 7.0.0.
In an FCIP environment, a replication device port may fail with a panic when FCIP FastWrite is used on HP 1606 SAN Extension Switch tunnels.	Fixed in Fabric OS 7.0.0.
Switches running Fabric OS 6.4.x lose manageability from WebTools/DCFM and all LED's on the switch are amber. This is caused by the SNMPD not running after system resources are depleted from the upgrade. Switch traffic is not impacted, and it is still possible to manage the switches via the CLI. This affects switches only with no impact to directors.	**Workaround prior to upgrade:** Reboot the switch through the CLI command to recover. Fixed in Fabric OS 7.0.0.
Changing linkcost to maximum value of 65,535 causes fabric connectivity problems because all routes are lost in the fabric.	Fixed in Fabric OS 7.0.0.
Zone corruption occurs when copying all zonesets from one AD to another using "zone --copy <ADD_NUM>". Subsequent zoning related operations may result in zone termination and switch reboot.	**Workaround prior to upgrade:** To avoid the corruption code flow, instead of copying all zonesets at once from one AD to another (using zone --copy <ADD_NUM>), copy zonesets one by one using zone --copy <ADD_NUM> source_zoneset> Fixed in Fabric OS 7.0.0.
Customers may experience a large number of CRC errors and reduced performance on data transfers when connecting to tape drives on an HP 8/40 SAN Switch with Finisar optics.	Fixed in Fabric OS 7.0.0.
No error message was output when an incorrect syntax was used for the "cryptocfg --create -container" command . Subsequently, the customer had difficulty in configuring the HP StorageWorks Encryption SAN Switch because the incorrect syntax in the CLI creation of a container caused a problem when trying to define LUNs.	Fixed in Fabric OS 7.0.0.
The help text in Fabric OS 6.3.0 does not reflect the trackchangesset command is deprecated. Even though the command can still be entered, it has no effect.	Fixed in Fabric OS 7.0.0.
The HP StorageWorks DC04 SAN Director Switch is experiencing a high rate of internal CRC errors on select links.	Fixed in Fabric OS 7.0.0.
For both IPv4 and IPv6, the ipfilter tool incorrectly leaves unfiltered TCP and UDP ports 1024-49151 (inclusive), as well as TCP ports 80 and 443. These ports may not be blocked implicitly or explicitly.	Fixed in Fabric OS 7.0.0.
In a FICON environment, customers may experience IFCCs from CUP due to Address specific bit NOT being set.	Fixed in Fabric OS 7.0.0.
In a FICON environment, an SNMP query of nodeRNIDPortType will indicate n-port for E_Ports.	Fixed in Fabric OS 7.0.0.
The HP 2408 FCoE Switch does not update the optics digital diagnostics data during runtime. The 'show media' command does not show the TX/RX power value correctly after the user disconnects and reconnects the optical cable.	Fixed in Fabric OS 7.0.0.
In Fabric OS 6.4.1b, the RMON alarm value for etherStatsOversizePkts is not updated and is permanently set to 0.	Fixed in Fabric OS 7.0.0.
Various configuration status are not reflected to configFile. When a policy is modified by a user and uploaded via configUpload, the resulting configFile does not reflect the updated policy.	Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
FICON MIB traps are missing .21 in their OID resulting in a mismatch between the FICON link incident MIB trap OID prefix sent from a switch with the actual OID values for these traps as per the MIB definition and MIB reference manual.	Fixed in Fabric OS 7.0.0.
Class three frame discards may occur when supportshow is executed. Customer may observe SCSI/IO errors when supportsave is executed on specific platforms such as the HP 8/8 SAN Switch, HP 8/24 SAN Switch, HP 8/80 SAN Switch.	Fixed in Fabric OS 7.0.0.
The cfgclear description in CLI is misleading. The cfgsave command is required after executing the cfgclear command, but that is not clear from the description.	Fixed in Fabric OS 7.0.0.
The OUI 00:24:ff is not being translated in the WWN Company ID of the WebTools Name Server window and zoning window.	Fixed in Fabric OS 7.0.0.
Multiple paths went down on customers servers due to frames being periodically rejected by the switch.	Fixed in Fabric OS 7.0.0.
The port auto disable feature is not disabling all of the E_Ports on an HP StorageWorks DC SAN Backbone Director Switch when Loss of Synch occurs.	Fixed in Fabric OS 7.0.0.
WebTools can be launched from the Fabric Tree when using auto configured IPv6 address but should not be.	Fixed in Fabric OS 7.0.0.
On a switch with only IPv6 Address configured, users are unable to create Certificate Signing Request (CSR) files with seccertutil command.	Fixed in Fabric OS 7.0.0.
The portcfgshow command does not indicate NPIV capability for ports on an HP DC SAN Director 10/24 FCoE Blade even though these ports do support NPIV.	Fixed in Fabric OS 7.0.0.
In WebTools, customers could be misled by switch icons if both a HP 2408 FCoE Switch and an HP 8/40 SAN Switch are present in the same deployment.	Fixed in Fabric OS 7.0.0.
In an FCIP environment, executing the supportshow clears the ftrace buffers.	Fixed in Fabric OS 7.0.0.
The portname command behavior was changed in 6.3.x causing the open portname command to no longer work.	Fixed in Fabric OS 7.0.0.
WebTools does not display the IPv6 address of the switch management port.	Fixed in Fabric OS 7.0.0.
Customer may notice core files and RAS messages generated due to cald software verify errors.	Fixed in Fabric OS 7.0.0.
On an AG switch, a customer may see a type2 miss error for every FDISC ACC which is misleading because the FDISC ACC should not be counted as a type2 miss. In large fabric config and large zone database, cfgenable is taking a long time with FCIP links.	Fixed in Fabric OS 7.0.0.
Users can disable the NPIV function on FCoE port of an HP 2408 FCoE Switch.	Fixed in Fabric OS 7.0.0.
The status of fwfrucfg and trackchangesset are not overwritten by configDownload. If a customer updates a FRU config status or trackchangeset status, then uploads the config file, followed by a configdefault, the status will not be restored upon download of the config file.	Fixed in Fabric OS 7.0.0.
There is no implementation of dynamic checking for secondary metadata.	Fixed in Fabric OS 7.0.0.
It is not possible to make Enhanced TI zones on an HP 2408 FCoE Switch.	Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
The Relay Host IP in fwmailcfg must be reconfigures after firmwaredownload.	Fixed in Fabric OS 7.0.0.
The speed value of 8 Gbps acquired in ifSpeed differs from the specification.	Fixed in Fabric OS 7.0.0.
The documentation for the fabricprincipal command needs to be updated to indicate the CLI with -p 0x02 "should not" be used rather than "cannot be used" because the command can be executed successfully.	Fixed in Fabric OS 7.0.0.
SNMP traps and related RASLOGs may not be generated as expected. For example, SNMP-1008 messages and traps stop while a port is bouncing every 20 minutes.	Fixed in Fabric OS 7.0.0.
FCIP based acceleration sending Link Busy response to unsolicited status frame is causing failures.	Fixed in Fabric OS 7.0.0.
IPv6 named Certificate Signing Request (CSR) files may not be FTP'd to some Windows based ftp servers because Windows servers do not accept the ":" character in the filename which is present in IPv6 CSR filenames.	Fixed in Fabric OS 7.0.0.
DCFM Real-Time and Historical graph on FCIP tunnels with multiple HP StorageWorks B-Series Multi-protocol Router Blades display only one tunnel.	Fixed in Fabric OS 7.0.0.
Processes started during telnet session do not end when session abruptly ends; the fwmailcfg binary continues to run on the switch taking up large amounts of CPU cycles.	Fixed in Fabric OS 7.0.0.
There are some documentation errors in the Message Reference Guide for Fabric OS6.4.1.	Fixed in Fabric OS 7.0.0.
The HP 1606 SAN Extension Switch generates spurious C2-1011 raslog errors when portloopbacktest is run.	Fixed in Fabric OS 7.0.0.
There is no support for Windows LDAP with IPv6.	Fixed in Fabric OS 7.0.0.
There is no support for SFP inserted/absent/faulty states to Fabric Watch FRU monitoring catagory.	Fixed in Fabric OS 7.0.0.
The compression settings displayed with the "ALL" option do not show the active compression mode.	Fixed in Fabric OS 7.0.0.
If Ethernet settings have been customer configured via ifmodset, they may be reset to default values after a firmware upgrade.	**Workaround prior to upgrade:** Reset Ethernet port parameters using ifmodeset command. Fixed in Fabric OS 7.0.0.
Resources are lost when a circuit is down for long periods of time. There are complete FCIP Circuit and Tunnel failures after buffer pool resources are depleted on an HP 1606 SAN Extension Switch and HP DC SAN Director Multiprotocol Extension Blade. The tunnel is able to recover after a reboot is performed.	Fixed in Fabric OS 7.0.0.
A newly replaced device on an FL_Port does not register with name server properly, and the initiator is unable to discover the device.	Fixed in Fabric OS 7.0.0.
When writes to compact flash timeout, software reset recovery results in access to a bad pointer triggering a kernel switch panic and results in a switch reboot.	Fixed in Fabric OS 7.0.0.
AN-1010 messages are logged on R_RDY ports when interoperating with M-Series switches.	**Workaround prior to upgrade:** Use the "portcfgislmode slot/port 1" in setting the E_Port in McDATA rdy mode, so that bottleneck detection will not monitor it for traffic congestion. Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
RX_Count is misleading/invalid on the HP 2408 FCoE switch when port 0 is included.	Fixed in Fabric OS 7.0.0.
Licesnes may be added erroneously after a configdownload.	Fixed in Fabric OS 7.0.0.
CP HA Failover occurs after software verify errors. Error messages such as the following are output : 2010/11/28-09:42:02, [RAS-1004], 80, SLOT 6 | FFDC | FID 128, WARNING, STXW002, Software 'verify' error detected.	**Workaround prior to upgrade:** Ignore the error message if seen in conjunction with HA Failover. Fixed in Fabric OS 7.0.0.
The following error is seen when trying to copy to "running-config" on an HP 2408 FCoE Switch:% Warning: This rule id is used for another classifier.	Fixed in Fabric OS 7.0.0.
A Switch with default SSH keys are not carried forward with a firmware upgrade.	**Workaround prior to upgrade:** Manually delete the interfering key on the host side and login again. Fixed in Fabric OS 7.0.0.
Disabling a range of online VEX ports on an HP StorageWorks 400 Multi-protocol Router causes VE_Ports on DCX to become G_Ports if the disabling occurs prior to the VE_Ports coming online.	Fixed in Fabric OS 7.0.0.
The time displayed is not in synch with timezone / time chanes when timezone has been set or if time was changed with date command during firmwarecommit.	Fixed in Fabric OS 7.0.0.
The command portbeacon --enable ports on the HP StorageWorks SAN Director 6-port 10Gb FC Blade does not cause the port LEDs to beacon. However, no error or warning msg is displayed when the command portbeacon --enable is issued.	Fixed in Fabric OS 7.0.0.
In a FICON environment, FE & FF ports are disabled without any warning message even when there is an FMS mode enable failure in the HP StorageWorks DC04 SAN Director Switch.	Fixed in Fabric OS 7.0.0.
Users are unable to configure Fabric Watch VE_Ports event notifications by using Web Tools because the VE_Port class tab is not displayed in Web Tools (Fabric Watch) but is displayed via CLI.	Fixed in Fabric OS 7.0.0.
There is no column for discard_C3_timeout_only in porterrshow.	**Workaround prior to upgrade:** Users should use the portstatsshow CLI to find the c3 Rx and Tx timeout discards as the porterrshow CLI will only show the summation of many c3 discards. Fixed in Fabric OS 7.0.0.
The Port Admin window indicates Online/Healthy, yet additional port Info indicates the port is segmented.	Fixed in Fabric OS 7.0.0.
In a FICON environment, FICON CUP cannot be enabled when a faulted blade exists in the chassis.	Fixed in Fabric OS 7.0.0.
After enabling https, a failover will cause the active CP to still be running http and users will not have https services after a failover.	**Workaround prior to upgrade:** Issue another HA Failover to cause both CPs to reset the web services. Fixed in Fabric OS 7.0.0.
In Access Gateway mode, devices with QoS enabled on HBA and F_Port and N_Port would intermittently come online without the AoQ bit set.	Fixed in Fabric OS 7.0.0.
Removal of the HP StorageWorks B-Series Multi-protocol Router Blade or the HP DC SAN Director 10/24 FCoE Blade could crash the HP StorageWorks DC SAN Backbone Director Switch during POST.	Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
FAN frames are not being sent by the switch to loop devices after LIP when fcAL.fanFrameDisable is set to 0.	Fixed in Fabric OS 7.0.0.
The HP 2408 FCoE Switch and HP DC SAN Director 10/24 FCoE Blade ignore initial discovery solicitations from the CNA and go into pre-FIP mode when spanning tree is enabled.	**Workaround prior to upgrade:** Disable the spanning tree or configure the interface as "spanning-tree edgeport". Fixed in Fabric OS 7.0.0.
RASLOG message SCN-1001 severity may be misleading.	Fixed in Fabric OS 7.0.0.
In a FICON environment, the HP StorageWorks DC SAN Backbone Director Switch portstatsshow indicates a different value than RMF is reading through the CUP using CMD= 32 (Read port statistics). Even though the counters are updated in both cases, different values are returned for each interface.	Fixed in Fabric OS 7.0.0.
There are inconsistencies between WebTools and the CLI; WebTools do not show configured slots for expired trial trial slot-based licenses, but the CLI does.	Fixed in Fabric OS 7.0.0.
The SNMP: IF-MIB: ifTable excludes entries of port indices greater than the port index of the Logical ISL. Users will not be able to get the ports that have an index greater than port index of the Logical ISL.	Fixed in Fabric OS 7.0.0.
Duplicate columns are shown in WebTools port admin advanced mode when moving between basic and advanced mode.	Fixed in Fabric OS 7.0.0.
Executing the configdownload command without disabling the LS switch may core dump from cfgadm.	Fixed in Fabric OS 7.0.0.
An IPSec enabled FCIP circuit may bounce after running a 200 ms delay and 1% packet loss for 4 days.	Fixed in Fabric OS 7.0.0.
In Access Gateway mode, in WT-Port Admin, hitting the save button multiple times in the Edit configuration window may cause the WebLinker to crash.	**Workaround prior to upgrade:** Be sure to select the save button only once. Fixed in Fabric OS 7.0.0.
Running system verification multiple times could cause HP DC SAN Director 10/24 FCoE Blade to fault.	Fixed in Fabric OS 7.0.0.
The supportshowcfgshow in supportsave does not match the output from a supportshow.	Fixed in Fabric OS 7.0.0.
Multiple devices lose connectivity when route is not deleted from previous trunk master after disabling and enabling the trunk.	Fixed in Fabric OS 7.0.0.
The HP StorageWorks DC SAN Backbone Director Switch management port speed of 1000 Mbps is displayed on WebTools as 10 Mbps.	Fixed in Fabric OS 7.0.0.
In a FICON environment, after IPL many FICON CHPIDs come up in Invalid Attachment state.With DCFM actively polling the fabric and reboot of the core HP StorageWorks DC SAN Backbone Director Switch in a large edge fabric, HA may go out of sync.	Fixed in Fabric OS 7.0.0.
With DCFM actively polling the fabric and reboot of the core HP StorageWorks DC SAN Backbone Director Switch in a large edge fabric, HA may go out of sync.	Fixed in Fabric OS 7.0.0.
A standby CP may experiences a software "VERIFY" error causing the CPs to lose sync.Port Auto Disable does not allow user finer granularity control over the 5 possible events for LINK DOWN that currently trigger a port being held offline.	Fixed in Fabric OS 7.0.0.
Port Auto Disable does not allow user finer granularity control over the 5 possible events for LINK DOWN that currently trigger a port being held offline.	Fixed in Fabric OS 7.0.0.

Table 9 Fabric OS 7.0.0 closed defects *(continued)*

Closed fixes summary	Solution
There is no functionality for querying all the IP addresses associated with the management interface of a device (both IPv4 and IPv6) over SNMP.	Fixed in Fabric OS 7.0.0.
Hard port faults may occur without warning messages and devices may lose their connectivity on the HP StorageWorks 4/32B SAN Switch running Fabric OS 5.3.0.	Fixed in Fabric OS 7.0.0.
There is no provision for adding a user configurable refresh to WebTools to decrease in the polling cycle time.	Fixed in Fabric OS 7.0.0.
Resets are not correctly captured in the HP StorageWorks B-series Multi-protocol Router Blade.	Fixed in Fabric OS 7.0.0.
"Token freed on wrong logical port" RAS message seen when cfgsave was executed. The cfgsave command does not complete in a fabric containing 6K devices.	**Workaround prior to upgrade:** Avoid enabling the default all access with more number of devices. Fixed in Fabric OS 7.0.0.
Superfluous warning messages (ZONE-1057) against front domain/translate domain specified in a TI zone added to an edge fabric while the system was failing over to the standby CP.	Fixed in Fabric OS 7.0.0.
Switch config reset does not clear slot license consumed fields; license configuration settings are not reset when the configdefault command is executed.	Fixed in Fabric OS 7.0.0.
An unexpected error message is output when selecting the user tab for the user role. A user with no chassis role permission will not be able to view his own login information through WebTools.	**Workaround prior to upgrade:** Users with no chassis role permission can use the CLI to refer the user login information. Fixed in Fabric OS 7.0.0.

Fabric OS 7.0.0a fixes

Table 10 (page 51) lists the fixes that were closed for this release.

Table 10 Fabric OS 7.0.0a closed defects

Closed fixes summary	Solution
CRC and/or CDR-5021 errors seen on HP StorageWorks DC SAN Backbone Director Switch, HP StorageWorks DC04 SAN Director Switch, or the HP 8/40 SAN Switch switch platforms.	Fixed in Fabric OS 7.0.0a.
The HP StorageWorks DC SAN Director 64-port 8 Gbps FC Blade is set to FAULTY 51 after removal/insertion of that blade in an HP SN8000B 4-Slot SAN Backbone Director Switch or HP SN8000B 8-Slot SAN Backbone Director Switch chassis with diagpost on.	Fixed in Fabric OS 7.0.0a.
The FIPS firmware integrity check has gaps in coverage.	Fixed in Fabric OS 7.0.0a.
Disabling or powering off the HP StorageWorks Encryption SAN Switch causes the SVC nodes to go offline and into service mode.	**Workaround prior to upgrade:** Restart storage with VI/VT members (HP StorageWorks Encryption SAN Switch) online. Fixed in Fabric OS 7.0.0.
In a FICON environment, the active config is out of synch with Fabric OS indicating a port is blocked after HA Failover.	Fixed in Fabric OS 7.0.0a.
The HP StorageWorks Encryption SAN Switch is set to faulty, due to I/O sizes greater than 512KB starting at LBA 0 for an encrypted LUN.	Fixed in Fabric OS 7.0.0a.
In a FICON environment, CE DE is received by the host 5 seconds after B1 CCW causing a channel timeout.	Fixed in Fabric OS 7.0.0a.

Table 10 Fabric OS 7.0.0a closed defects *(continued)*

Closed fixes summary	Solution
Encrypted/Compressed E_Port trunk goes down following CP failover.	**Workaround prior to upgrade:** Execute slotpoweroff /slotpoweron commands on the blade. Fixed in Fabric OS 7.0.0.
Following an upgrade of a fabric switch attached to an Access Gateway switch with QoS enabled from Fabric OS 6.2.x to 6.3.x , the Access Gateway N_port is stuck in G_Port.	**Workaround prior to upgrade:** Disable QoS on the fabric switch port and the port will come up normally. Fixed in Fabric OS 7.0.0.
In a FICON environment, persistent state is not set in Portcfg when the port is blocked in the IPL file.	Fixed in Fabric OS 7.0.0a.
D_Port is failing when more than 4-ports are initiated simultaneously.	**Workaround prior to upgrade:** Toggle the port. Fixed in Fabric OS 7.0.0.
In a FICON environment, the LPATH Reset flag is not cleared on local paths if CUB is returned for first init IU after the reset and the path can't be assigned as CRP.	Fixed in Fabric OS 7.0.0a.
It may not be possible to restart a TPERF session until all user disabled GE ports on the test tunnel are re-enabled. If a user disables GE_Ports on a TPERF test tunnel while a TPERF session is in progress and the TPERF session is terminated, TPERF may not be able to be restarted until the disabled GE_Ports are re-enabled. When in this state and the user attempts to re-start TPERF, they will get a message indicating that a TPERF session is already in progress.	Fixed in Fabric OS 7.0.0a.
BE credit loss detection and recovery not fully functional.	Fixed in Fabric OS 7.0.0a.
In a FICON environment, local LPATHS are not cleared from CUP LPATH db upon implicit logo for port disable.	Fixed in Fabric OS 7.0.0a.
In Fabric Watch, a port is fenced during supportsave.	Fixed in Fabric OS 7.0.0a.
DP panicked after modifying a metric on an FCIP circuit using a crossport with IPSec enabled.	**Workaround prior to upgrade:** Disable IPsec on FCIP tunnel. Fixed in Fabric OS 7.0.0.
In a FICON environment, component (ms) dropping HA data update during logical switch delete and moving of ports.	Fixed in Fabric OS 7.0.0a.
HP SN8000B 4-Slot SAN Backbone Director Switch gets inundated with [PS-5011] internal messages in the performance monitor.	Fixed in Fabric OS 7.0.0a.
There is a pdmd memory increase on the standby CP of an HP SN8000B 8-Slot SAN Backbone Director Switch with max LS creation and fully populated EX_Ports after a long period of time with I/O running	Fixed in Fabric OS 7.0.0a.
In a FICON environment, channel aborts I/O after presenting pending Attention status.	**Workaround prior to upgrade:** Disable FICON Tape pipelining. Fixed in Fabric OS 7.0.0a.
FIPS zeroization requires multiple prompting for DHCHAP clearing.	Fixed in Fabric OS 7.0.0a.

Fabric OS 7.0.0b fixes

Table 11 (page 53) lists the fixes that were closed for this release.

Table 11 Fabric OS 7.0.0b closed defects

Closed fixes summary	Solution
In a FICON environment, connectivity problems may occur in the fabric after changing a FID assignment. The switch in the fabric reported [RTWR-1002] and [RTWR-1003] messages are output to the RAS log.	**Workaround prior to upgrade:** Reboot or power cycle the affected switches. Fixed in Fabric OS 7.0.0b.
Secondary disk paths will not appear in the output from disk query commands.	Fixed in Fabric OS 7.0.0b.
Ports are fenced without errors during a supportsave.	Fixed in Fabric OS 7.0.0b.
In a FICON environment, Invalid Attachment and Name Server Query failures may occur due to delays in Name Server processing when programming CAM entries for the ASIC.	Fixed in Fabric OS 7.0.0b.
The application commands to move data between arrays will fail when FastWrite is enabled on an FCIP tunnel and there are two data replication port pairs.	**Workaround prior to upgrade:** The failure does not occur with only a single port pair or with FastWrite disabled. Fixed in Fabric OS 7.0.0b.
D-Port failures may occur in a high stress environment.	**Workaround prior to upgrade:** Stop and disable/enable the port. Fixed in Fabric OS 7.0.0b.
Firmwaredownload signature verification fails for directors, allowing invalid packages to be loaded as valid firmware.	Fixed in Fabric OS 7.0.0b.
A fabricd crash may occur when utilizing D_Port functionality.	Fixed in Fabric OS 7.0.0b.
Fabric Watch and Port Fencing Threshold settings erroneously apply to D-Ports, and could cause D-Ports to become fenced.	Fixed in Fabric OS 7.0.0b.
Hosts may lose access to storage after changing the FCR backbone domain ID on an HP StorageWorks DC SAN Backbone Director Switch/ HP StorageWorks DC04 SAN Director Switch with HP StorageWorks DC SAN Director 64-port 8Gb FC Blade and HP StorageWorks SAN Director 48-port 8Gb FC Blade installed. Frame drops occur on the backend ports of the blades.	Fixed in Fabric OS 7.0.0b.
There is a stuck VC on the HP StorageWorks DC04 SAN Director Switch backend ports between the Core Blade in slot 3 and the HP DC SAN Director Multiprotocol Extension Blade in slot 7.	Fixed in Fabric OS 7.0.0b.
Excessive port errors (encoding out errors) may occur on HP 8/8 or 8/24 SAN Switches ISL ports in a configuration consisting of a mix of 4Gb user ports interconnected via 8Gb ISLs.	Fixed in Fabric OS 7.0.0b.
Backend CRC errors and timeouts may occur on an HP StorageWorks DC SAN Director 64-port 8Gb FC Blade in an HP SN8000B 8-Slot SAN Backbone Director Switch or HP SN8000B 4-Slot SAN Director Switch.	Fixed in Fabric OS 7.0.0b.
Ports are not auto disabled because LOSN is not recognized by portautodisable.	Fixed in Fabric OS 7.0.0b.
The track changes feature with Trackchanges setting of 1,1 is not generating the TRCK-1003 message when a SSH session is logged out.	Fixed in Fabric OS 7.0.0b.
The Name Server contains stale entries after a faulty disk is removed from a loop attached device.	Fixed in Fabric OS 7.0.0b.
After an HP DC SAN Director Multiprotocol Extension Blade is replaced the InBand management configuration is not properly loaded on to the new blade.	Fixed in Fabric OS 7.0.0b.
An FCIP Tunnel in an FCR Backbone may lose buffer credits and go down if FastWrite is enabled.	**Workaround prior to upgrade:** Disable FCIP FastWrite. Fixed in Fabric OS 7.0.0b.

Table 11 Fabric OS 7.0.0b closed defects *(continued)*

Closed fixes summary	Solution
The portcfgshow command displays incorrect values for the "Fill Word (Current)" field.	Fixed in Fabric OS 7.0.0b.
TopTalker Monitor fails when the monitor is changed from Egress to Ingress.	Fixed in Fabric OS 7.0.0b.
Duplicate E_Port SCN error messages are seen after an HAFailover.	Fixed in Fabric OS 7.0.0b.
HP B-series Network Advisor incorrectly displays devices as initiators for certain storage devices that may log in with an unknown FC4 type.	Fixed in Fabric OS 7.0.0b.
Customers may experience intermittent CRC errors which may result in data read failures when performing large data reads from 3rd party tape drives.	Fixed in Fabric OS 7.0.0b.
Users may not be able to configure TE interface after ceeportloopbacktest.	Fixed in Fabric OS 7.0.0b.
Tape jobs intermittently fail with tape pipelining enabled when utilizing a FICON to ESCON converter.	Fixed in Fabric OS 7.0.0b.
Unable to access the boot prom on a Brocade 8Gb SAN Switch for HP BladeSystem c-Class when installed in a c7000 BladeSystem enclosure.	Fixed in Fabric OS 7.0.0b.
When upgrading a switch in IM2/IM3 to Fabric OS 7.0 via WebTools, the failure message references the interopmode command, but does not provide WebTools instructions. The message should direct users to the Interoperability tab to change the switch to Brocade Native Fabric Mode.	Fixed in Fabric OS 7.0.0b.
The caution message output when executing D_Port CLI mentions "only Brocade Branded SFPs".	Fixed in Fabric OS 7.0.0b.
SOFf frame counter is not detecting SOFf frame ingress/egress when the filter monitor is enabled.	Fixed in Fabric OS 7.0.0b.
Firmware upgrade from v6.4 to Fabric OS 7.0 is blocked without sufficient information from the error message. A more detailed error message is needed.	Fixed in Fabric OS 7.0.0b.
Config download fails on the HP SN6000B 16Gb FC Switch with the following message: configDownload: Invalid Time Zone tz = (Asia/Tokyo) Process function of configdownload failed for filter ts, lrc = -1	Fixed in Fabric OS 7.0.0b.
In a FICON environment, XRC processing is not correctly reporting RRS Sequence Validation failures (via 0x0F52 command reject) in all cases. This can lead to LOGREC entries with Command Rejects with reason code 0x0F61 against a 0xFF command resulting in XRC suspensions.	Fixed in Fabric OS 7.0.0b.
HP SN8000B 4-Slot SAN Director Switch panics during systemverification when systemverification is run repeatedly.	Fixed in Fabric OS 7.0.0b.
All clear text and encrypted LUNs are reporting: LUN state unavailable.	Fixed in Fabric OS 7.0.0b.
When NPIV is disabled on FCoE ports prior to upgrading to Fabric OS 7.0.0x, NPIV cannot be enabled on those FCoE ports.	Fixed in Fabric OS 7.0.0b.
Although the encryption engine may receive a successful response when a logout is issued by the initiator, the encryption engine does not correctly handle Logout Extended Link with the initiator, and the initiator continues to successfully issue read commands to the encryption engine.	Fixed in Fabric OS 7.0.0b.
In a FICON environment, an FSPF error message appears as soon as the CEC POR is started, but does not appear in the errdumpall output.	Fixed in Fabric OS 7.0.0b.
Certain traffic patterns may cause backend CRC errors on HP StorageWorks DC SAN Director 64-port 8Gb FC Blades when installed in Slots 3 and 9 of an HP StorageWorks DC SAN Backbone Director Switch.	Fixed in Fabric OS 7.0.0b.
With the CS_CTL bit set properly, data is not traversing the correct FCIP H/M/L QoS connection.	Fixed in Fabric OS 7.0.0b.

Table 11 Fabric OS 7.0.0b closed defects *(continued)*

Closed fixes summary	Solution
Configured CS_CTL values are no longer valid on write data frames (F_CTL priority bit disabled) once frames are carried over FCIP links with FastWrite enabled.	Fixed in Fabric OS 7.0.0b.
The CEE command reference guide is missing operands in the "show running-config" command documentation.	Fixed in Fabric OS 7.0.0b.

Fabric OS 7.0.0c fixes

Table 12 (page 55) lists the fixes that were closed for this release.

Table 12 Fabric OS 7.0.0c closed defects

Closed fixes summary	Solution
EX_Port credit loss may go unnoticed due to missing receipt of RAS log CX-5021 messages in the FCR daemon. This occurs only on non-trunked EX_Ports and applies to integrated routing on 8 Gbps switches.	Fixed in Fabric OS 7.0.0c.
FabricWatch Port Class is not monitoring ICL ports. ICL Ports will not report any threshold warnings and will not be fenced for Port Class attributes.	Fixed in Fabric OS 7.0.0c.
After downgrading from Fabric OS 7.0.0a or 7.0.0b to Fabric OS 6.4.x on an HP DC SAN Backbone Director or a DC04 SAN Director, a route rebalance or recalculation will cause some ICL paths to be blocked. Connectivity between devices is lost after a route change.	**Workaround prior to upgrade:** Disable and then enable all ICL ports. Fixed in Fabric OS 7.0.0c.
It is not possible to create more than three tunnels with crossport circuit configuration on an HP DC SAN Director Multiprotocol Extension Blade in a chassis with multiple HP DC SAN Director Multiprotocol Extension Blades.	Fixed in Fabric OS 7.0.0c.
ICL Ports on the HP SN8000B SAN Directors may show "Mod_Val" on 1 out of 4 ports on a QSFP. The event log indicates a bad QSFP requiring reseat or replacement.	**Workaround prior to upgrade:** Reseating the QSFP may correct the issue. Fixed in Fabric OS 7.0.0c.
QSFP port status is not refreshed in the WebTools port admin window when it is open at the time of insertion. Insertion/Removal of the QSFP does not get updated and will not correctly display in an open Port Admin window.	**Workaround prior to upgrade:** Refresh, or close and reopen the Port Admin window. Fixed in Fabric OS 7.0.0c.
QSFP ICL ports are unexpectedly being fenced due to excessive state changes being logged while the QSFP was offline/disabled, even though the current high threshold value is not exceeded during the time the QSFP was online/enabled.	Fixed in Fabric OS 7.0.0c.
IPSec circuits may get stuck in an “in-progress” state and never come online in an IPSec configuration between an HP DC SAN Director Multiprotocol Extension Blade and an HP 1606 SAN Extension Switch.	**Workaround prior to upgrade:** Disable and then re-enable the port. Fixed in Fabric OS 7.0.0c.
The FruReplace CLI command in Fabric OS has been deprecated beginning with Fabric OS 7.0.0. However, if the command is attempted while performing replacement of a defective WWN card it will result in a potential failed transfer and can lead to the replacement WWN card also being unusable.	Fixed in Fabric OS 7.0.0c.
There is a host discovery issue from edge to edge with VE in a backbone fabric if EX_Ports are on ports 0-3 of an HP DC SAN Director Multiprotocol Extension Blade in slot 7 of an HP StorageWorks DC04 SAN Director Switch. In this configuration, hosts will be unable to discover targets across the FCIP backbone fabric.	Fixed in Fabric OS 7.0.0c.
In FICON environments, emulated FICON Tape Read Channel Program can grow too large, resulting in FICON protocol timeouts and aborts.	Fixed in Fabric OS 7.0.0c.

Table 12 Fabric OS 7.0.0c closed defects *(continued)*

Closed fixes summary	Solution
The WebTools Extended Fabric sub tab incorrectly displays the port speed as 0 for ports configured as N16 for all 16 Gbps switches. This is a display problem only and does not affect operation of the switches.	Fixed in Fabric OS 7.0.0c.
The diagshow diagnostic command displays incorrect speed values for ports on the HP DC SAN Director 10/24 FCoE Blade by displaying the back end 4 Gbps ports rather than the expected front end 10 Gbps ports.	Fixed in Fabric OS 7.0.0c.
Detection of a stuck Virtual Channel may be intermittently delayed by several minutes to more than an hour, but will eventually be detected.	Fixed in Fabric OS 7.0.0c.

Effective date

December 2011